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Sent: Tuesday, January 5, 2021 10:21 AM

To: Praskins, Wayne [Praskins.Wayne@epa.gov]; Juanita.bacey@dtsc.ca.gov; Han,
Terry@CDPH [Terry.Han@cdph.ca.gov]

CC: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil];
Robinson, Derek J CIV USN NAVFAC SW SAN CA (USA) [derek.j.robinson1@navy.mil];
Liscio, Matthew P CIV USN NAVSEA DET RASO VA (USA) [matthew.liscio@navy.mil]

Subject: N62473-17-D-0006 CTO: N6247318F5065 Parcel G - Soil Data Package TU-98 & SU-28

Attachments: CTO5065_RSY20Use3_DataPackage_12222020.pdf;
CTO5065_RSY29Use2_DataPackage_12182020.pdf

Dear Wayne, Nina and Terry,

To support the agencies oversight/split sampling effort and as a curtesy of information sharing, attached you will find Soil Data Package 01 of 03 for Parcel G Phase 1 SU-28 and Soil Data Package 03 of 06 for Parcel G Phase 1 TU-98 .

Please let me know if you have any questions.

Very Respectfully,

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Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 20 Lift 3	Soil Origin: TU-098D ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 12/22/2020

Systematic Soil Sample Data: RSY 20 Lift 3							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU098D-001	1	Systematic	12,171	15,658	0.536	0.0136	0.0362
HPPG-ESU-TU098D-002	2	Systematic	12,461	15,658	0.543	-0.0382	N/A
HPPG-ESU-TU098D-003	3	Systematic	12,416	15,658	0.437	-0.0258	N/A
HPPG-ESU-TU098D-004	4	Systematic	12,437	15,658	0.527	0.0219	N/A
HPPG-ESU-TU098D-005	5	Systematic	12,394	15,658	0.652	-0.0621	N/A
HPPG-ESU-TU098D-006	6	Systematic	12,244	15,658	0.403	0.0258	N/A
HPPG-ESU-TU098D-007	7	Systematic	12,557	15,658	0.357	-0.0226	N/A
HPPG-ESU-TU098D-008	8	Systematic	12,528	15,658	0.462	-0.00161	N/A
HPPG-ESU-TU098D-009	9	Systematic	12,524	15,658	0.379	-0.0113	N/A
HPPG-ESU-TU098D-010	10	Systematic	12,242	15,658	0.441	0.0196	N/A
HPPG-ESU-TU098D-011	11	Systematic	12,554	15,658	0.457	-0.0321	-0.0105
HPPG-ESU-TU098D-012	12	Systematic	12,325	15,658	0.343	0.0127	N/A
HPPG-ESU-TU098D-013	13	Systematic	12,518	15,658	0.329	0.025	N/A
HPPG-ESU-TU098D-014	14	Systematic	11,975	15,658	0.103	-0.0049	N/A
HPPG-ESU-TU098D-015	15	Systematic	12,064	15,658	0.436	0.00978	N/A
HPPG-ESU-TU098D-016	16	Systematic	12,504	15,658	0.435	-0.0466	N/A
HPPG-ESU-TU098D-017	17	Systematic	12,872	15,658	0.294	-0.000945	N/A
HPPG-ESU-TU098D-018	18	Systematic	12,199	15,658	0.152	-0.0209	N/A
HPPG-ESU-TU098D-019	19	Systematic	12,674	15,658	0.402	0.0202	N/A
HPPG-ESU-TU098D-020	20	Systematic	12,759	15,658	0.364	-0.0202	N/A
HPPG-ESU-TU098D-021	21	Systematic	12,735	15,658	0.376	0.00544	0.0413
HPPG-ESU-TU098D-022	22	Systematic	12,445	15,658	0.382	0.00336	N/A
HPPG-ESU-TU098D-023	23	Systematic	12,658	15,658	0.494	-0.0192	N/A
HPPG-ESU-TU098D-024	24	Systematic	12,250	15,658	0.345	-0.0347	N/A
HPPG-ESU-TU098D-025	25	Systematic	12,458	15,658	0.469	-0.0289	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Maximum					0.652	0.0258	0.0413
Mean					0.4047	-0.0085	0.0223
Median					0.403	-0.0049	0.0362
Minimum					0.103	-0.0621	-0.0105
Standard Deviation					0.1157	0.0244	N/A

Biased Soil Sample Data: RSY 20 Lift 3							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU098D-B-001	1	Biased	12,750	15,658	0.518	0.0184	0.0226

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10272020-PG-ROV-241	10/27/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10282020-PG-JSS-249	10/28/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10282020-PG-JSS-247	10/28/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10282020-PG-JSS-247	10/28/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 20 Lift 3
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 17 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 17 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-30.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 31-65). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 31-65). Samples HPPG-F-023 and HPPG-F-024 are field duplicates, correlating to systematic samples -001 and -003. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 31-65). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 20 Lift 3 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-098D ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-098.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-20-U3				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	5.01	28.07	15.81	16.03	4.02
ROI-06	69.15	144.28	103.86	104.19	10.29
ROI-07	51.10	105.25	78.88	78.18	9.06
ROI-08	92.21	168.34	128.75	128.29	11.95
ROI-10	2,237.41	2,838.01	2,600.97	2,603.91	71.44

Statistical Summary Reference Background

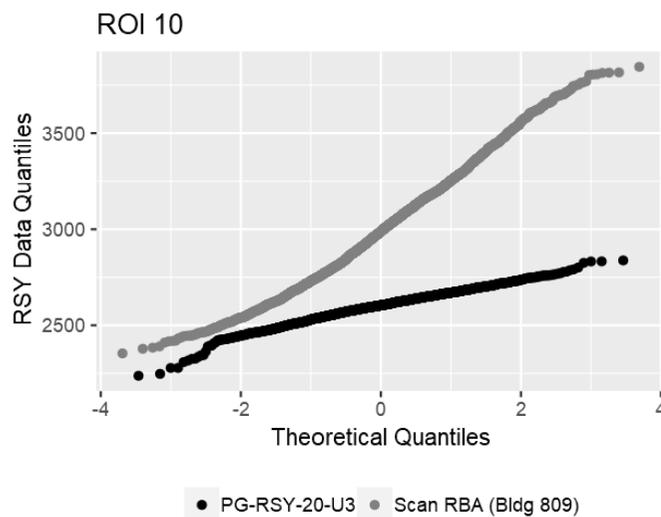
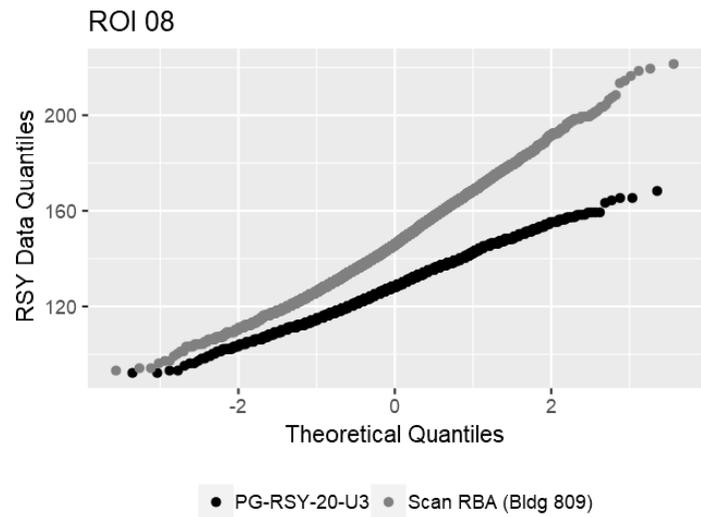
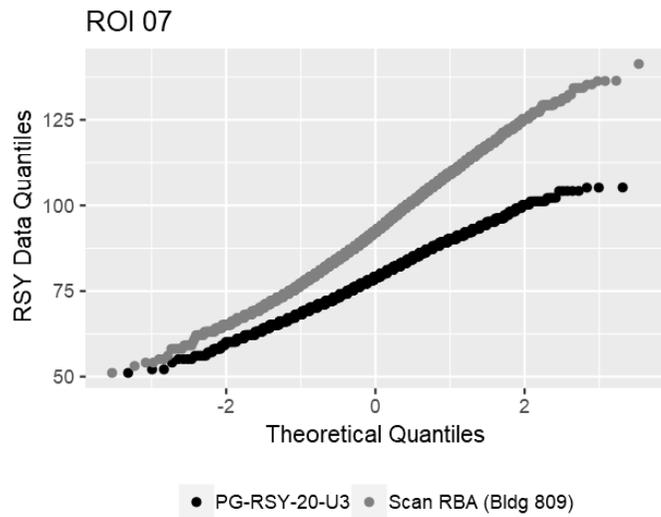
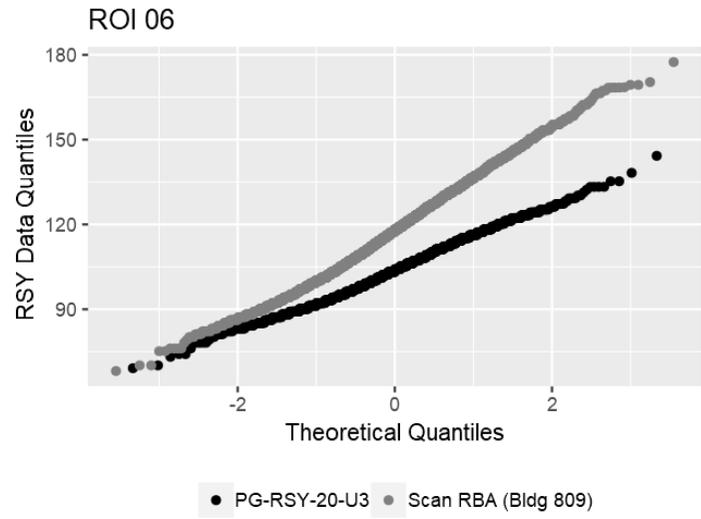
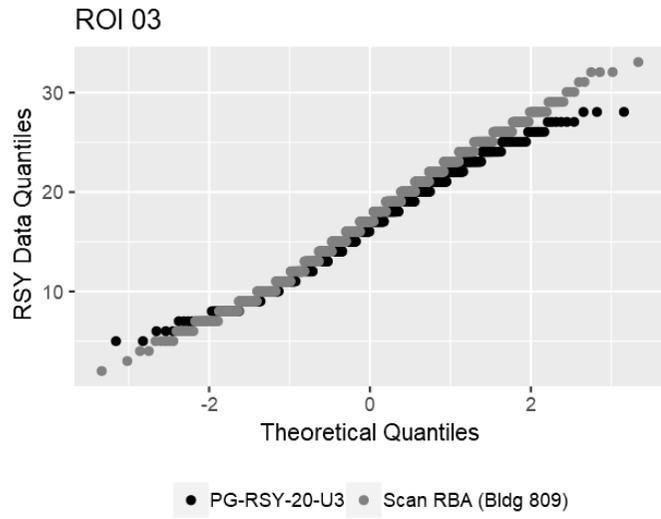
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-20-U3	2053
Scan RBA (Bldg 809)	4632

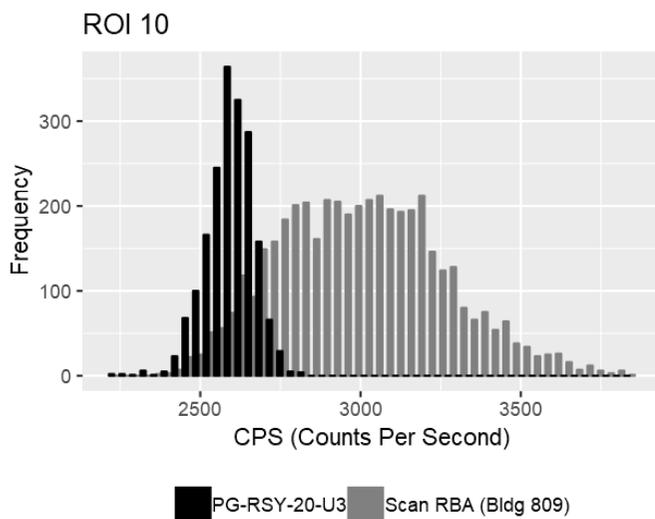
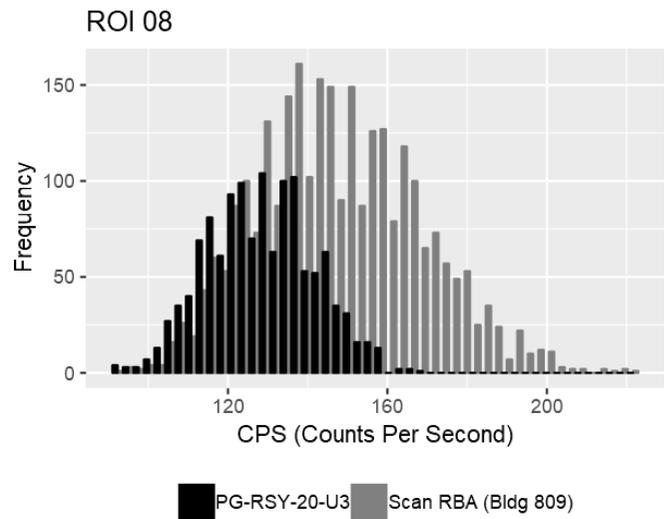
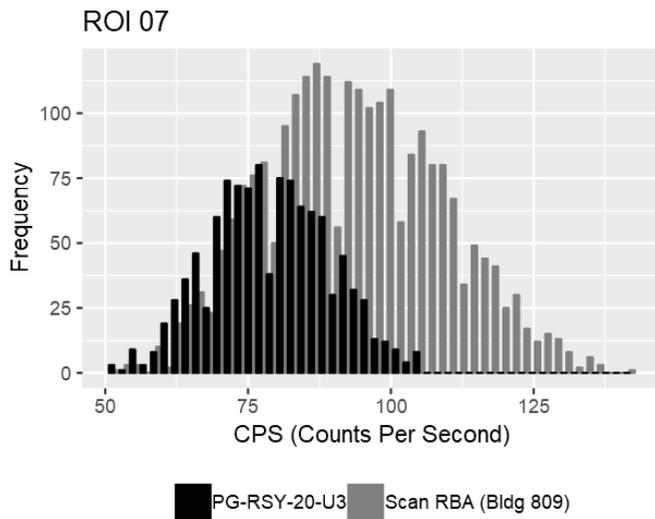
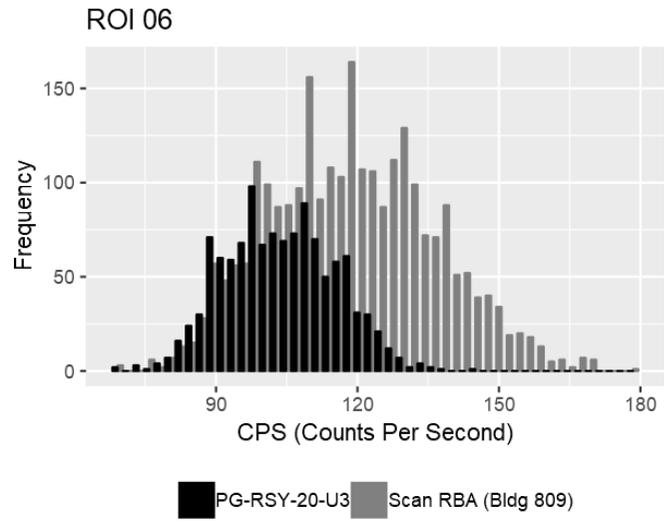
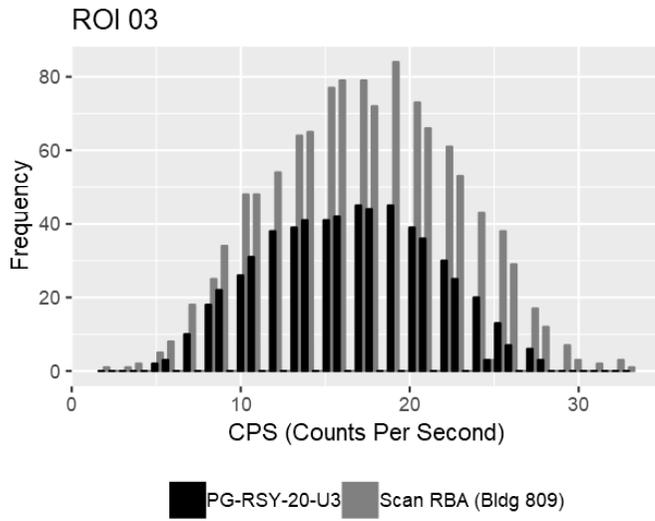
Soil Scan Statistics

Normal Q-Q Plots



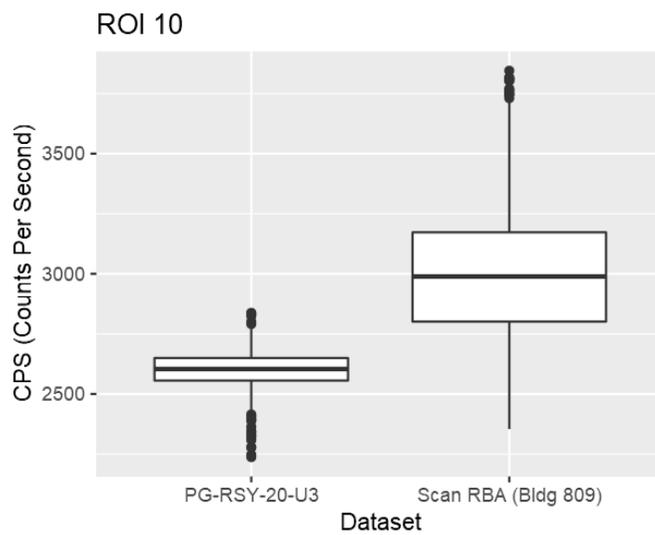
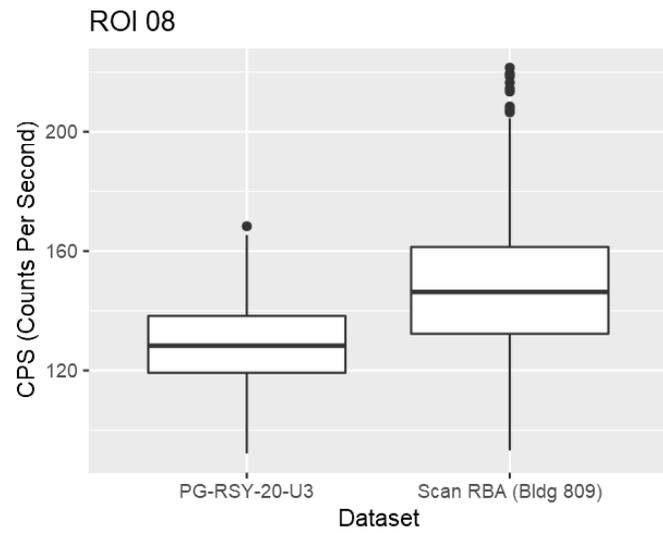
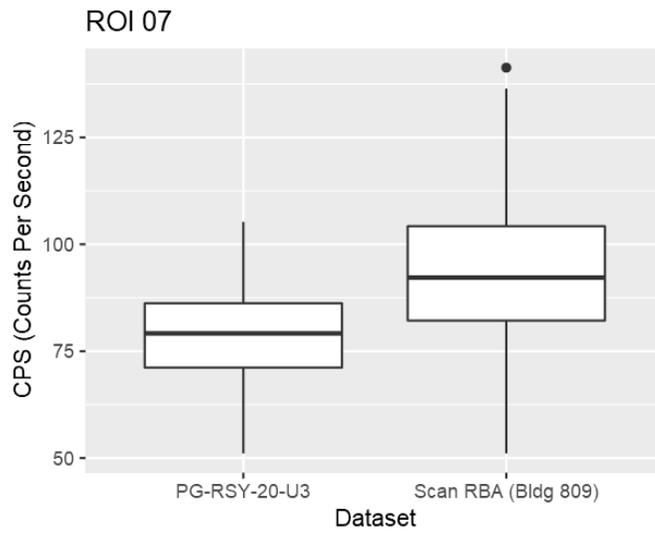
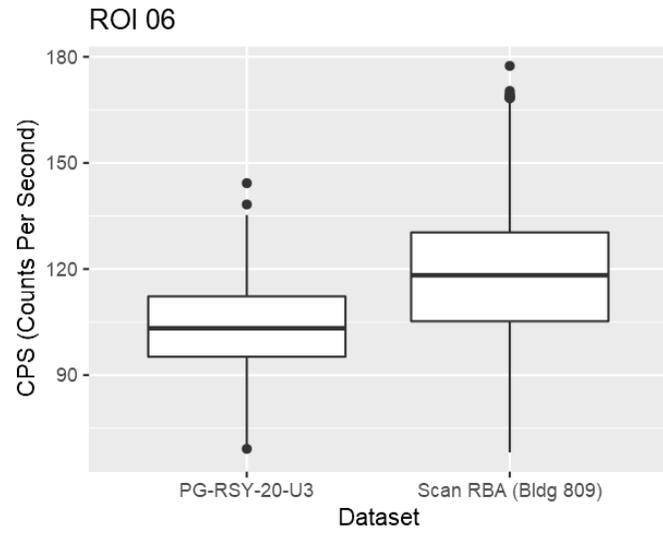
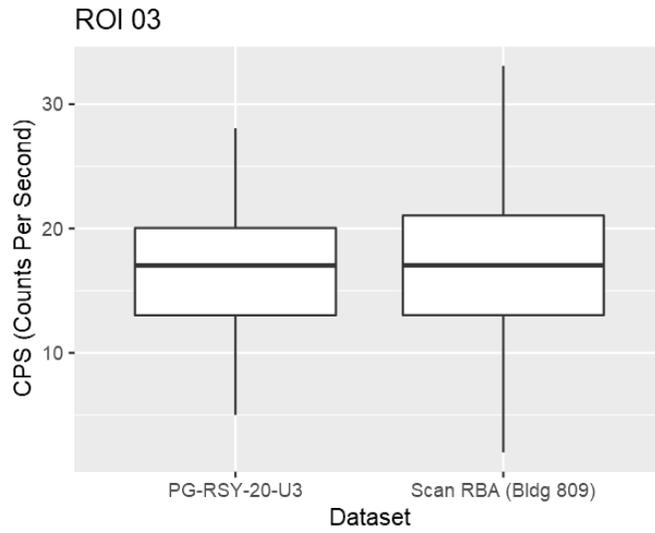
Soil Scan Statistics

Histograms



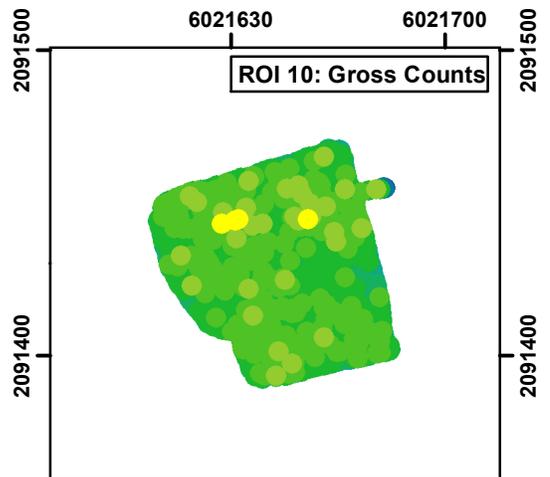
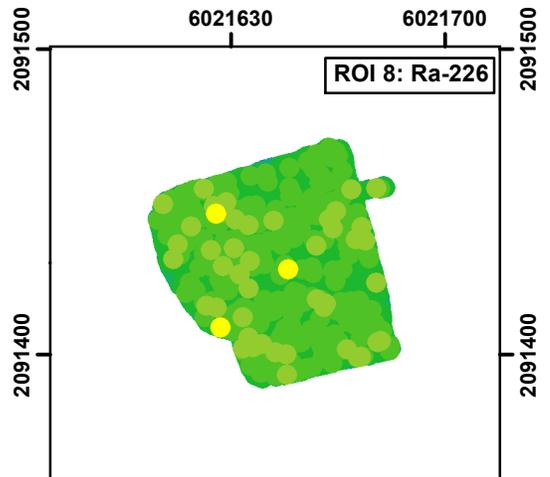
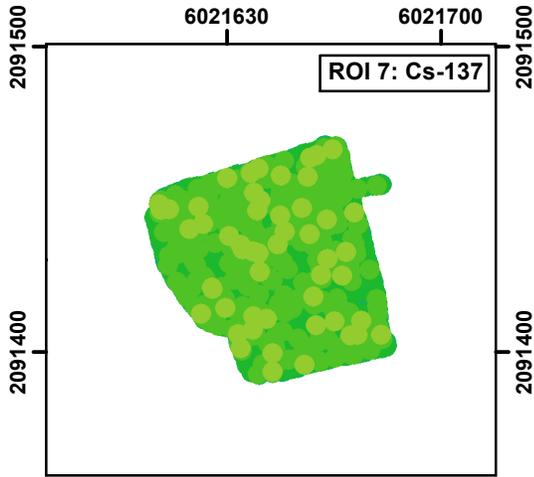
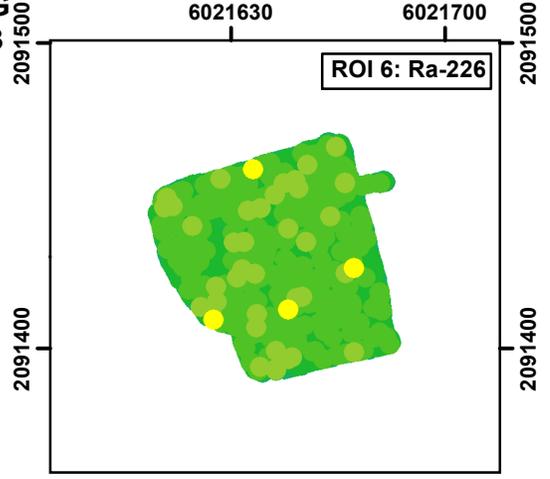
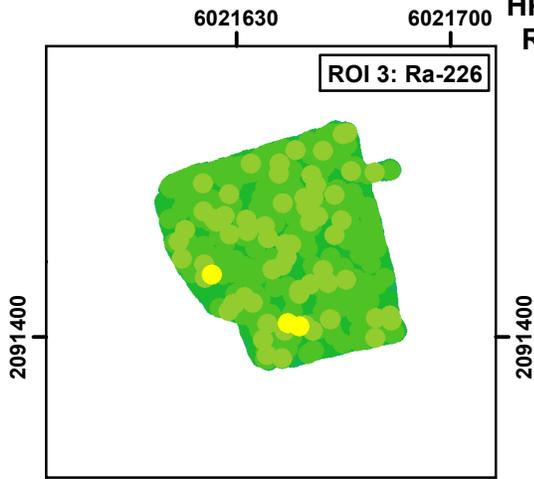
Soil Scan Statistics

Box Plots



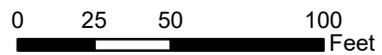
RSI Data Plots
HPNS Parcel G
RSY 20 Use 3

TU-098D ESU



RS 700 Gamma Walkover Survey Data (VD1)

- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

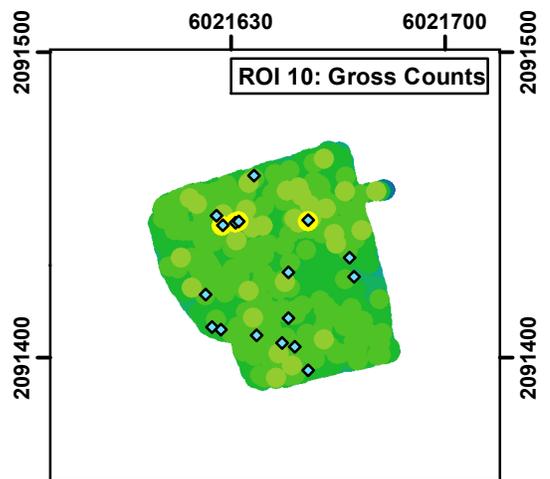
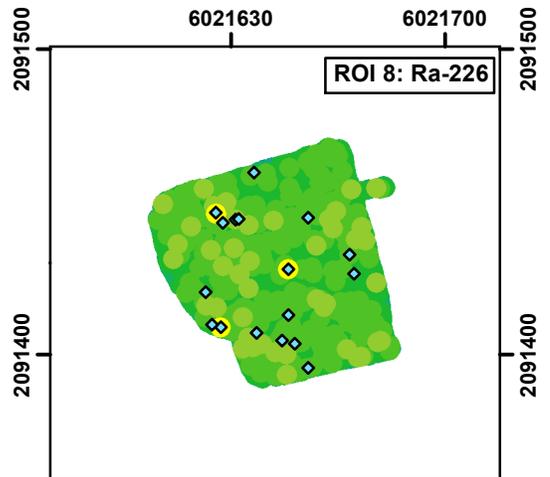
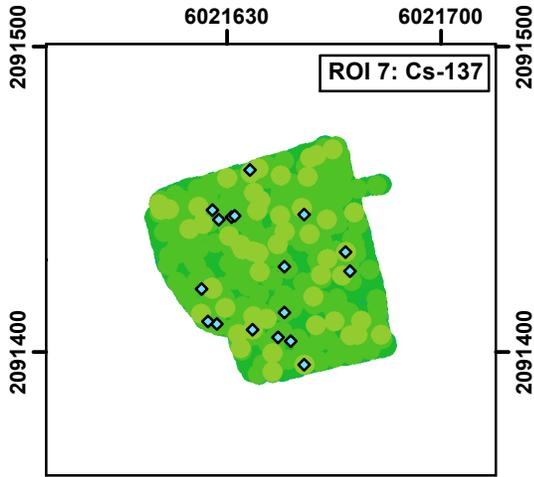
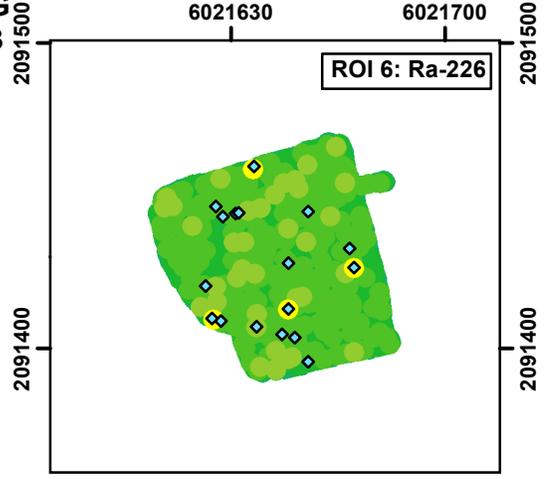
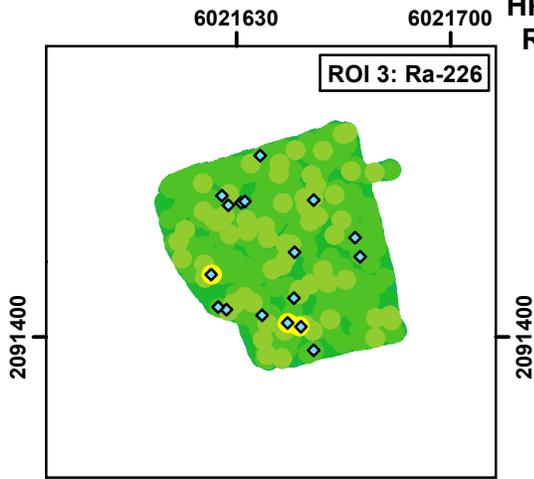


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 20 Use 3

TU-098D ESU



RS 700 Gamma Walkover Survey Data (VD1)

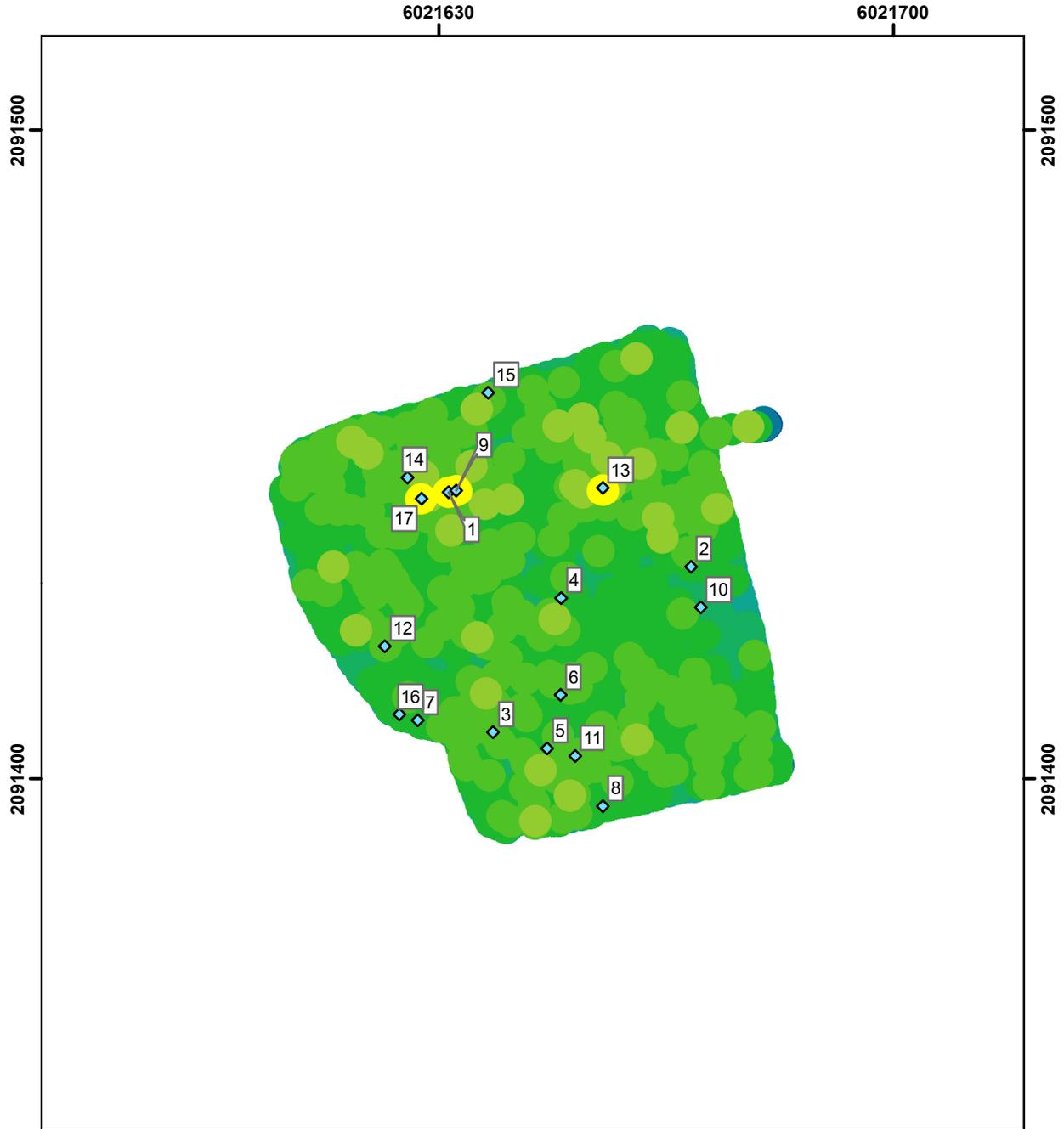
◆ Follow-Up Location	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Follow-Up Static Survey HPNS Parcel G RSY 20 Use 3

TU-098D ESU

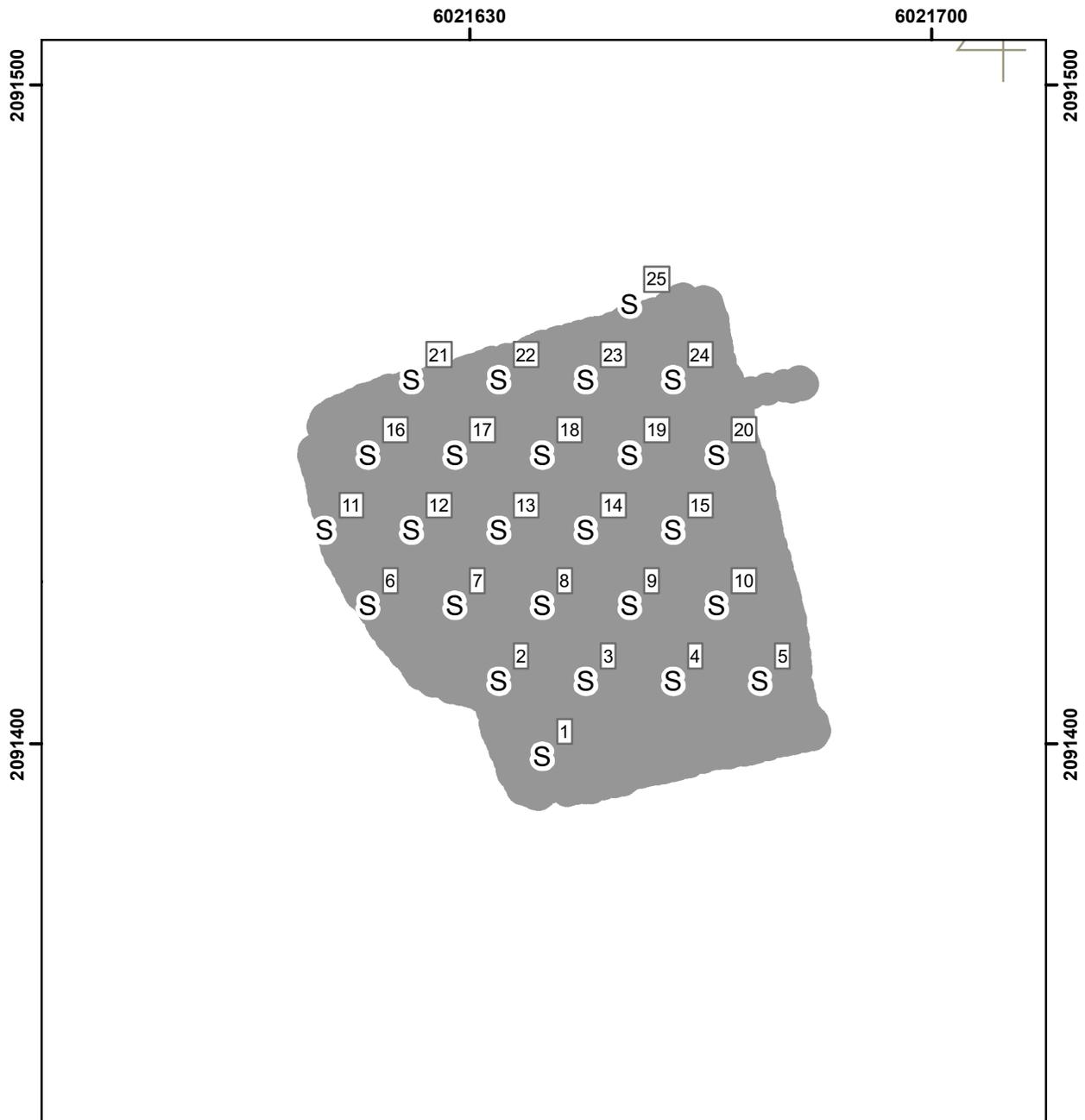


RSY 20 Use 3 (VD1, ROI 10 Gross Gamma)		
◆ Follow-Up Location	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

25 12.5 0 25 Feet
Coordinate system: CSP Zone III, NAD83, US Survey Foot

Systematic Sampling HPNS Parcel G RSY 20 Use 3

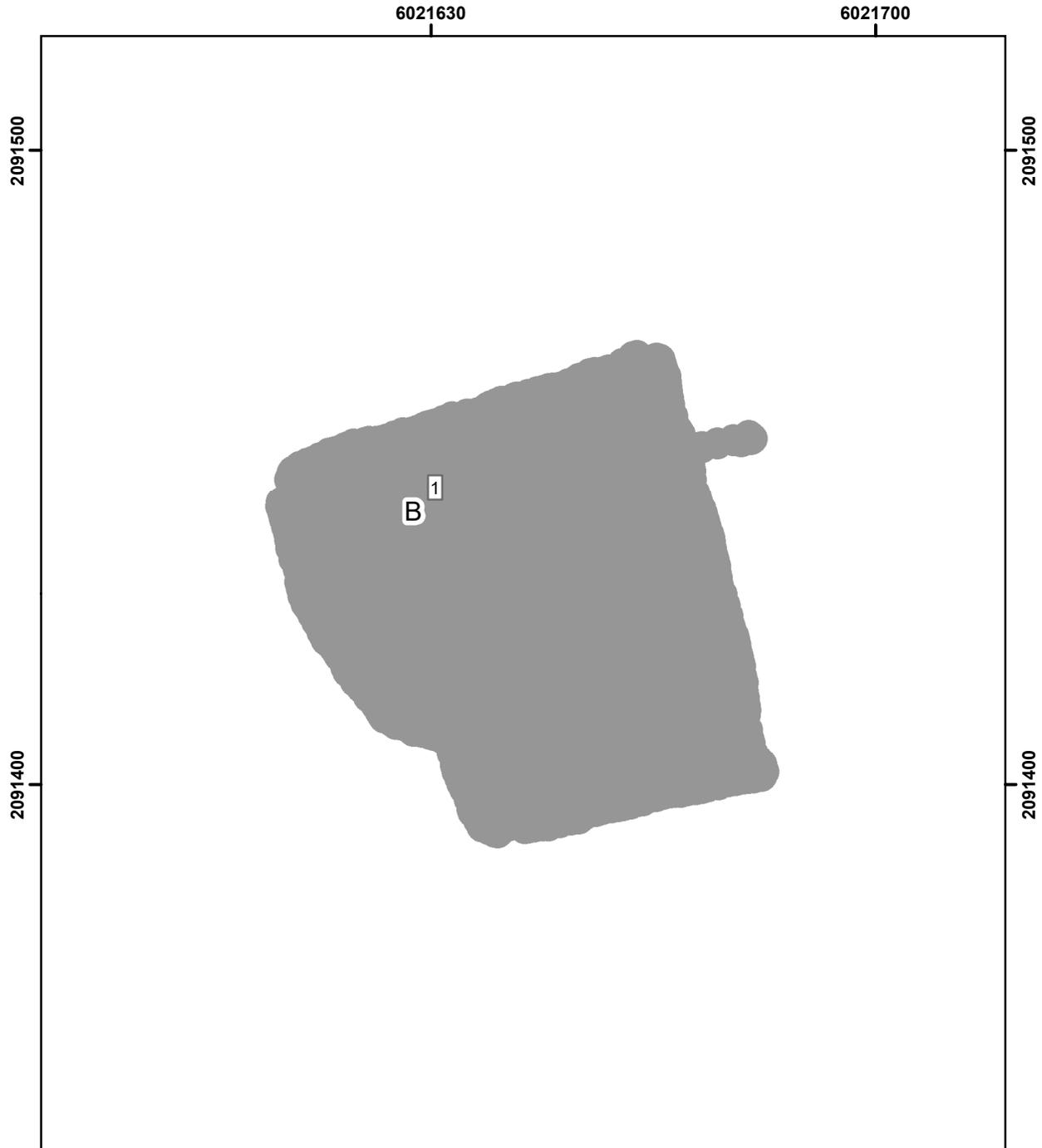
TU-098D ESU



RSY 20 Use 3 S Systematic Sample Location ● RS-700 GWS Coverage	0 10 20 40 Feet
	Coordinate system: CSP Zone III, NAD83, US Survey Foot 

**Biased Sampling
HPNS Parcel G
RSY 20 Use 3**

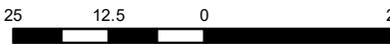
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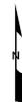
RSY 20 Use 3

- B** Biased Sample Location
- RS-700 GWS Coverage

25 12.5 0 25 Feet

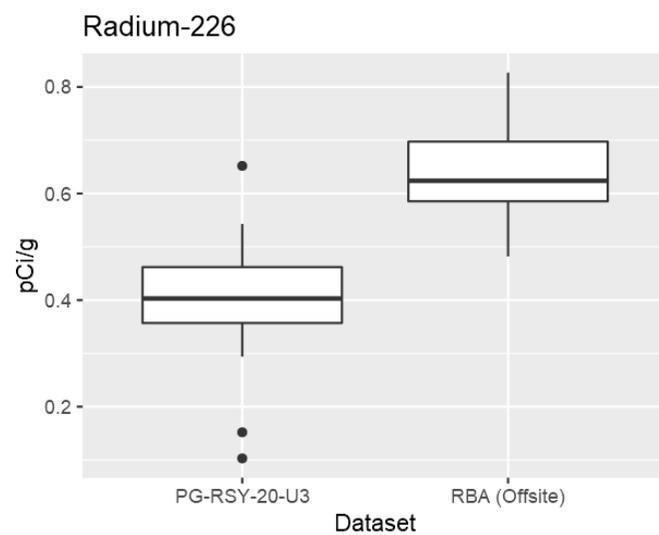
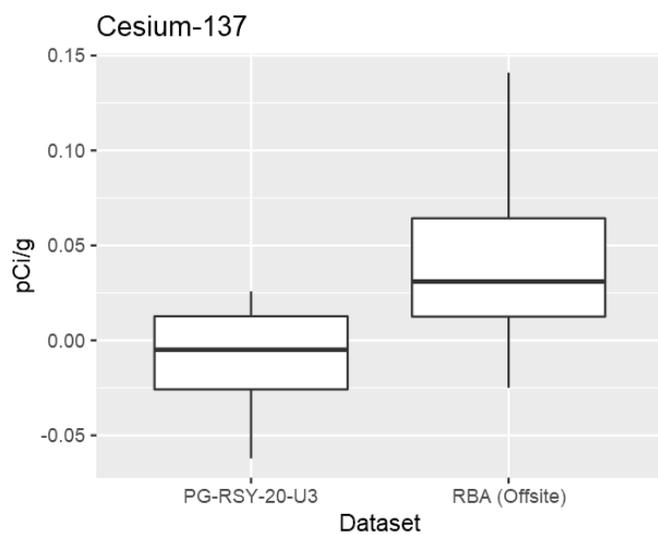
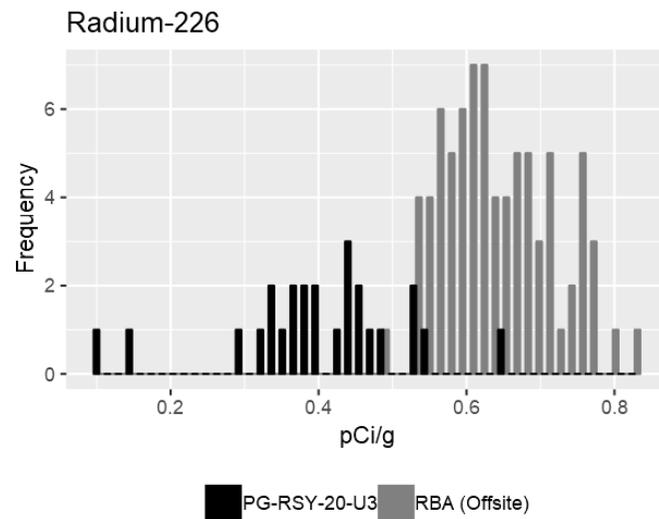
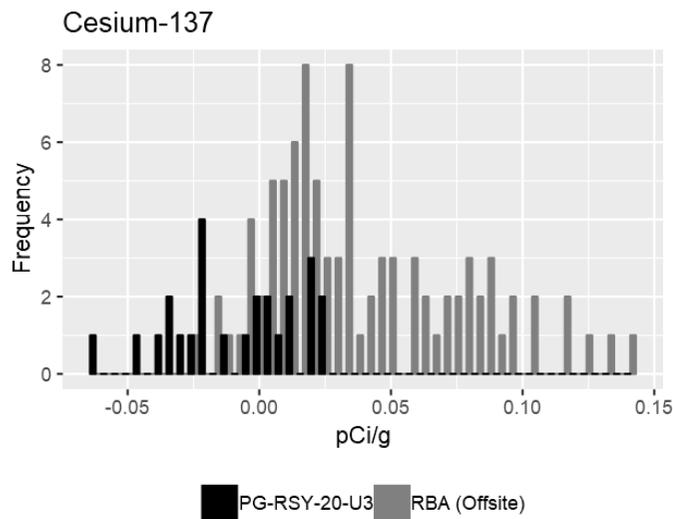
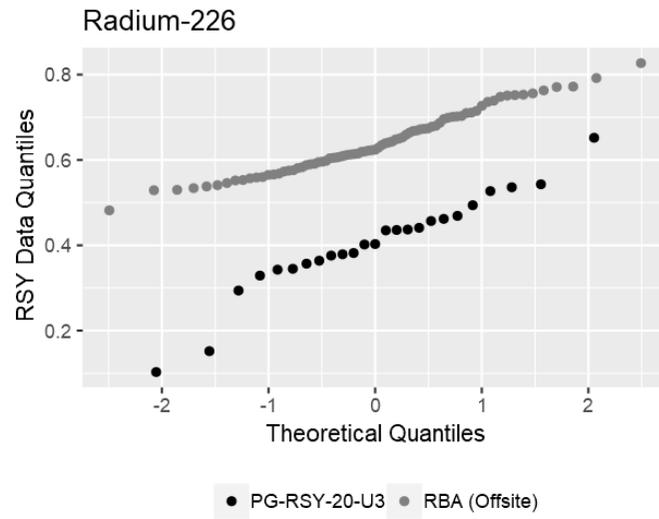
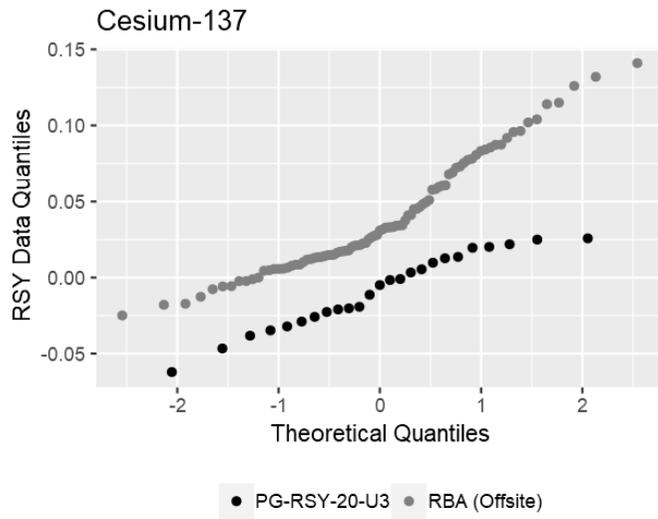


Coordinate system: CSP Zone III, NAD83, US Survey Foot



APTIM

Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Rs-226** Location: **RSY 20 Use 3**
 LBGR: **0.403** pCi/g

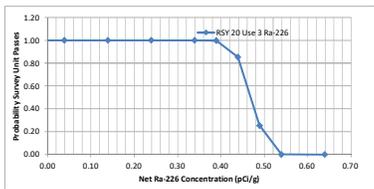
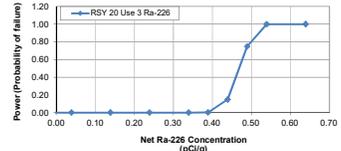
DOGL: **1**
 Median SU Data
 LBGR = **0.403**

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT RANKS	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1	S
0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	59	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	26	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.56	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	104	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	57	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.72	R	0.721	122	0	41.5	R
0.77	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.59	50.5	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	28	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.58	S	0.133	23	23	101	R
0.54	S	0.14	24	24	102.5	R
0.437	S	0.034	16	16	102.5	R
0.527	S	0.124	22	22	104	R
0.62	S	0.249	25	25	105	R
0.603	S	0	13	13	106	R
0.357	S	-0.046	7	7	107	R
0.462	S	0.059	19	19	108	R
0.379	S	-0.024	10	10	109	R
0.441	S	0.038	17	17	110.5	R
0.467	S	0.064	18	18	110.5	R
0.343	S	-0.06	5	5	112	R
0.329	S	-0.074	4	4	113	R
0.103	S	-0.3	1	1	114	R
0.486	S	0.033	15	15	115	R
0.435	S	0.032	14	14	116.5	R
0.294	S	-0.109	3	3	116.5	R
0.152	S	-0.251	2	2	118	R
0.402	S	-0.001	12	12	119	R
0.364	S	-0.039	8	8	120	R
0.376	S	-0.027	9	9	121	R
0.382	S	-0.021	11	11	122	R
0.494	S	0.091	21	21	123	R
0.345	S	-0.058	6	6	124	R
0.469	S	0.068	20	20	125	R
Sum =			7876	325		

POWER CURVE CALCULATION

Concentration (C)	above Background (C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.6	-0.26	-5.7	0.00001	0.00000	0.025	0.024989	0.158016	10292.2	0.00	1.00
0.7	-0.16	-4.9	0.00020	0.00001	0.51	3.572099	1.89	869.236	0.00	1.00
0.8	-0.06	-4.0	0.00234	0.00017	5.8475	57.65651	7.593189	213.416	0.00	1.00
0.9	0.04	-3.1	0.01695	0.00269	42.3675	790.5102	27.93761	56.6973	0.00	1.00
1	0.14	-2.3	0.03855	0.00847	96.375	2238.871	47.31459	32.3363	0.00	1.00
1.1	0.24	-1.4	0.16110	0.06390	402.748	12005.68	109.5704	11.1673	0.00	1.00
1.2	0.34	-0.6	0.33669	0.18476	839.218	22720.33	150.7326	5.22208	0.00	1.00
1.25	0.39	-0.1	0.47181	0.30561	1179.54	26144.76	161.6934	2.76338	0.00	1.00
1.3	0.44	0.3	0.58400	0.42142	1460	25318.47	159.1178	1.04552	0.15	0.85
1.35	0.49	0.7	0.68969	0.54407	1724.23	21567.84	146.8599	-0.6664	0.75	0.25
1.4	0.54	1.2	0.80193	0.69990	2004.82	14760.88	121.4944	-3.1151	1.00	0.00
1.5	0.64	2.0	0.92158	0.86577	2303.38	8372.123	73.28476	-9.2369	1.00	0.00

Number of Samples	
LBGR	0.403
Avg	5.16
N	25.23
N/2	13
Actual N	25
SU σ	0.116
Z(1-alpha)	2.326
Z(1-beta)	1.645



QUANTILE TEST

From NUREG 1505, Table A.7b. Values of r and k for the Quantile Test When α is Approximately 0.025

25 n (number of survey unit measurements)
 10 m (number of reference area measurements)

Use:
 $m = 100$
 $n = 25$
 $r = 4$
 $k = 3$
 0.025 alpha

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

of R: 100 n
 # of S: 25 m
 Avg Rank R: 73.5
 Avg Rank S: 13

For m or n greater than 20, the critical value (k) can be calculated from

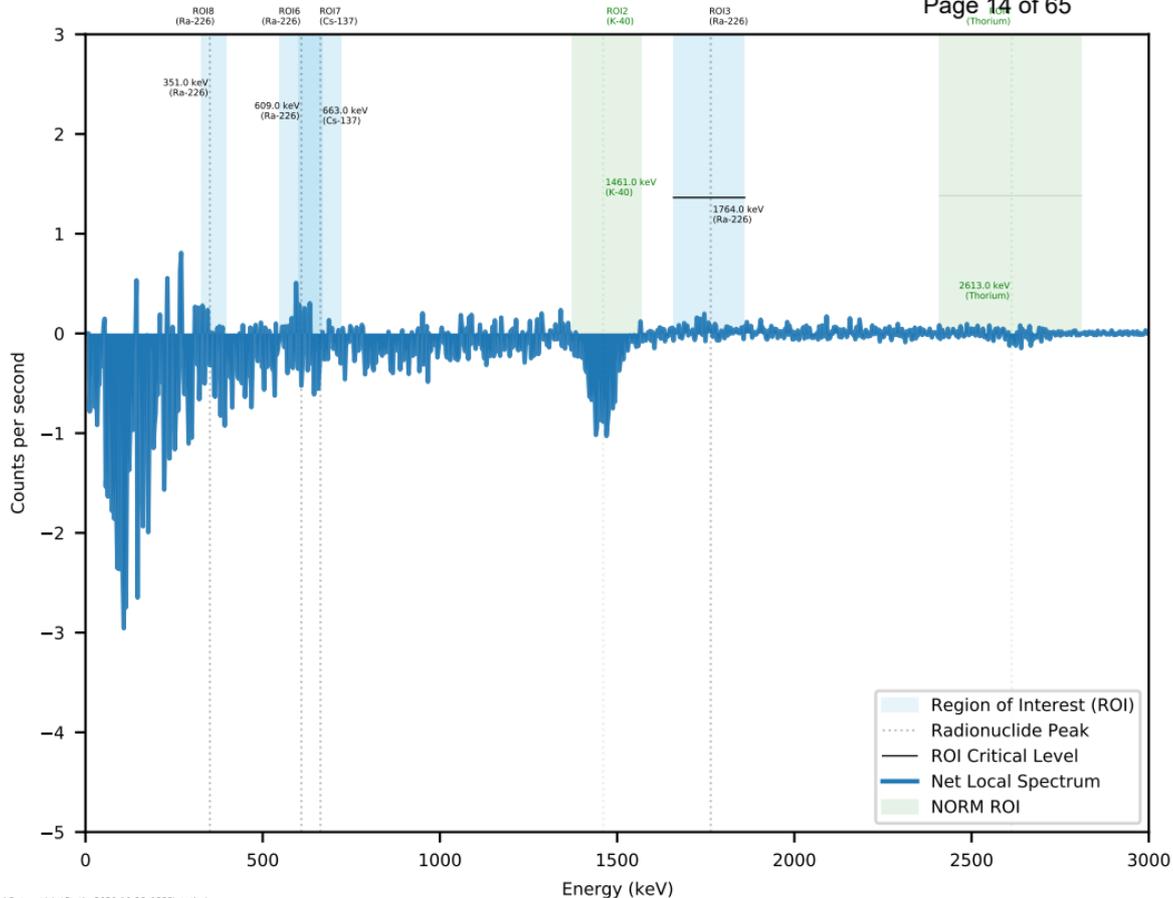
$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

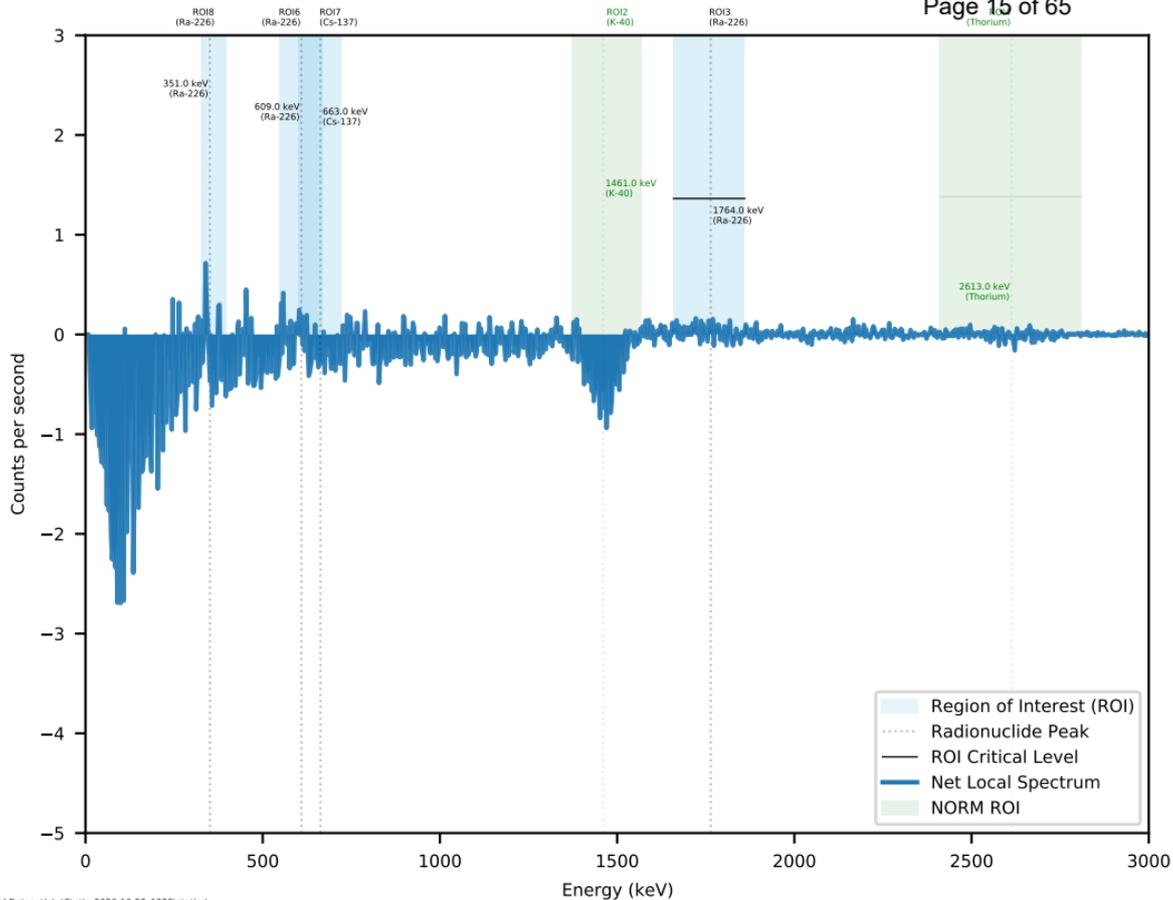
$z = 99.0\%$ percentile of standard normal distribution = 2

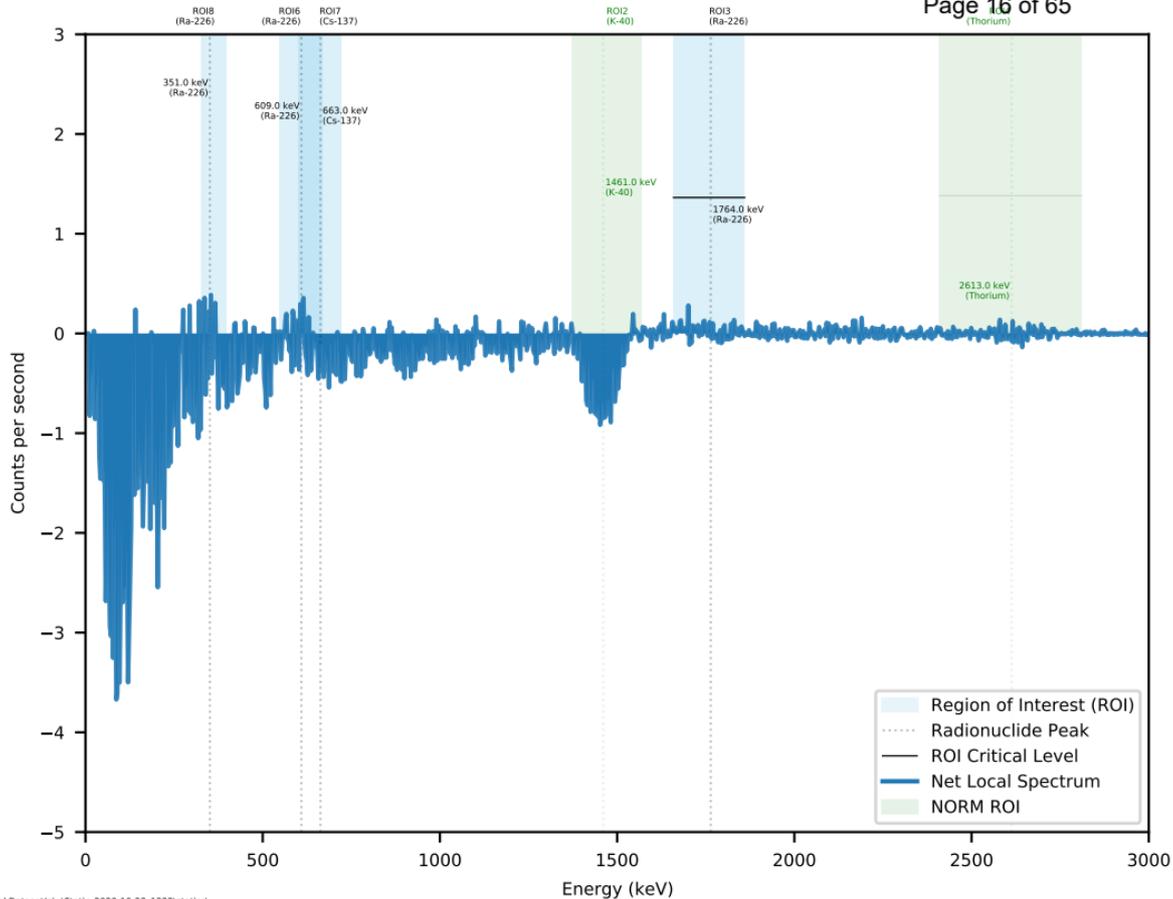
$k = 1951.9$

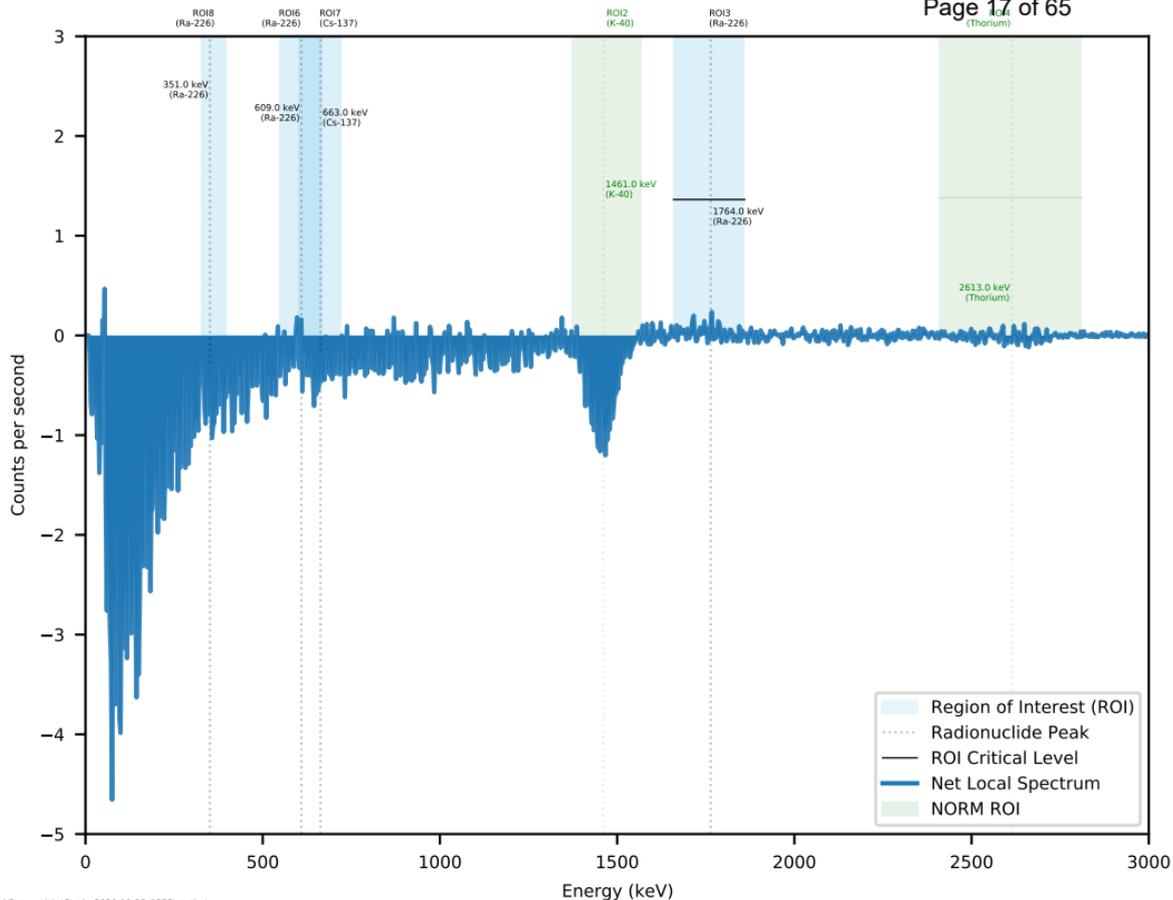
$\alpha = 0.2 = 0.01$
 $\beta = 0.05$

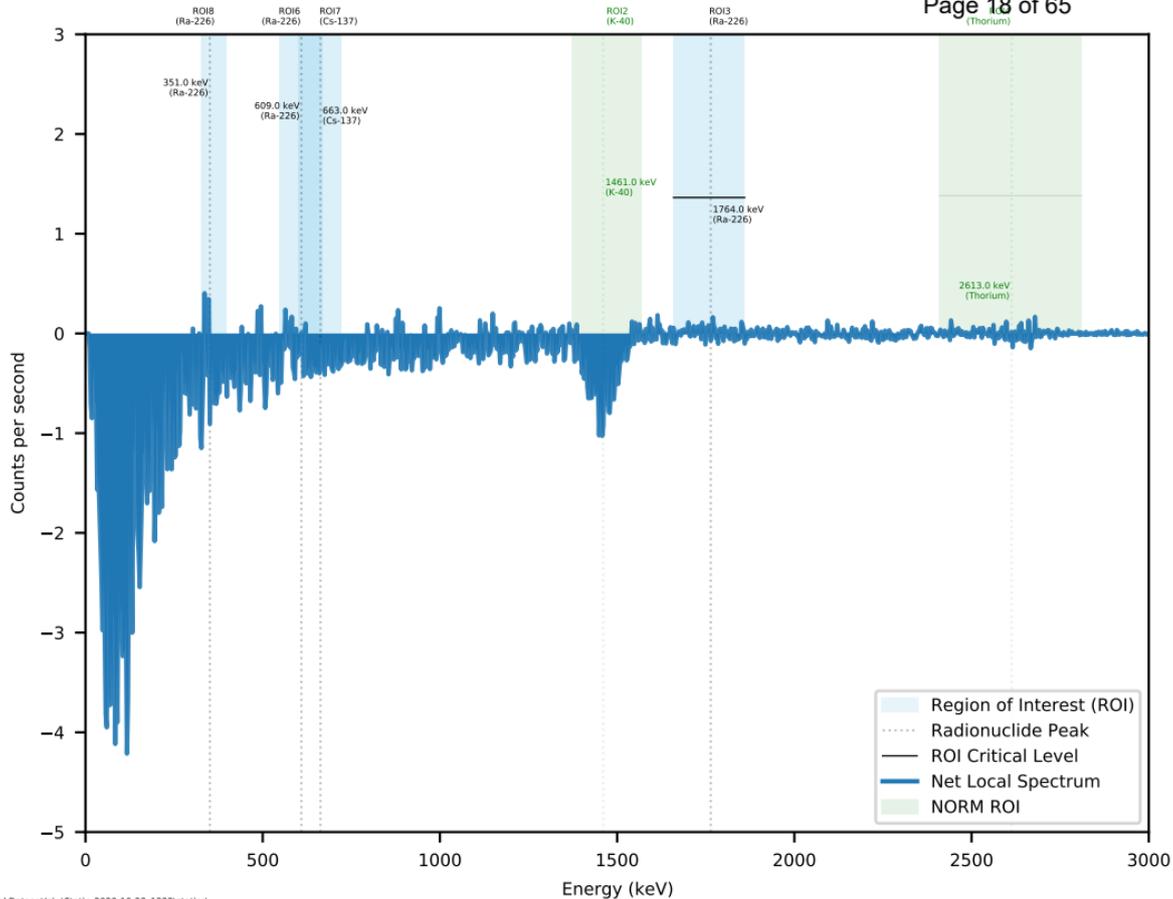
Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

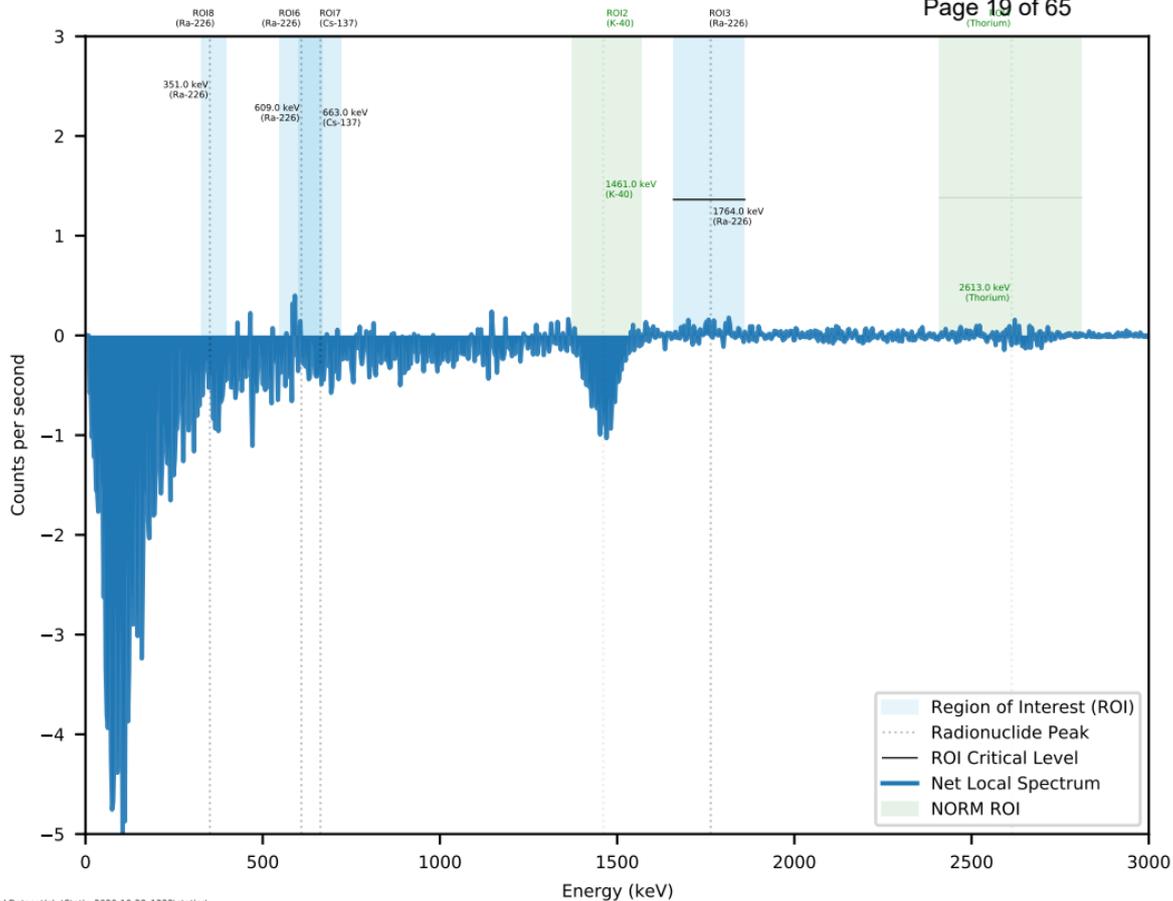


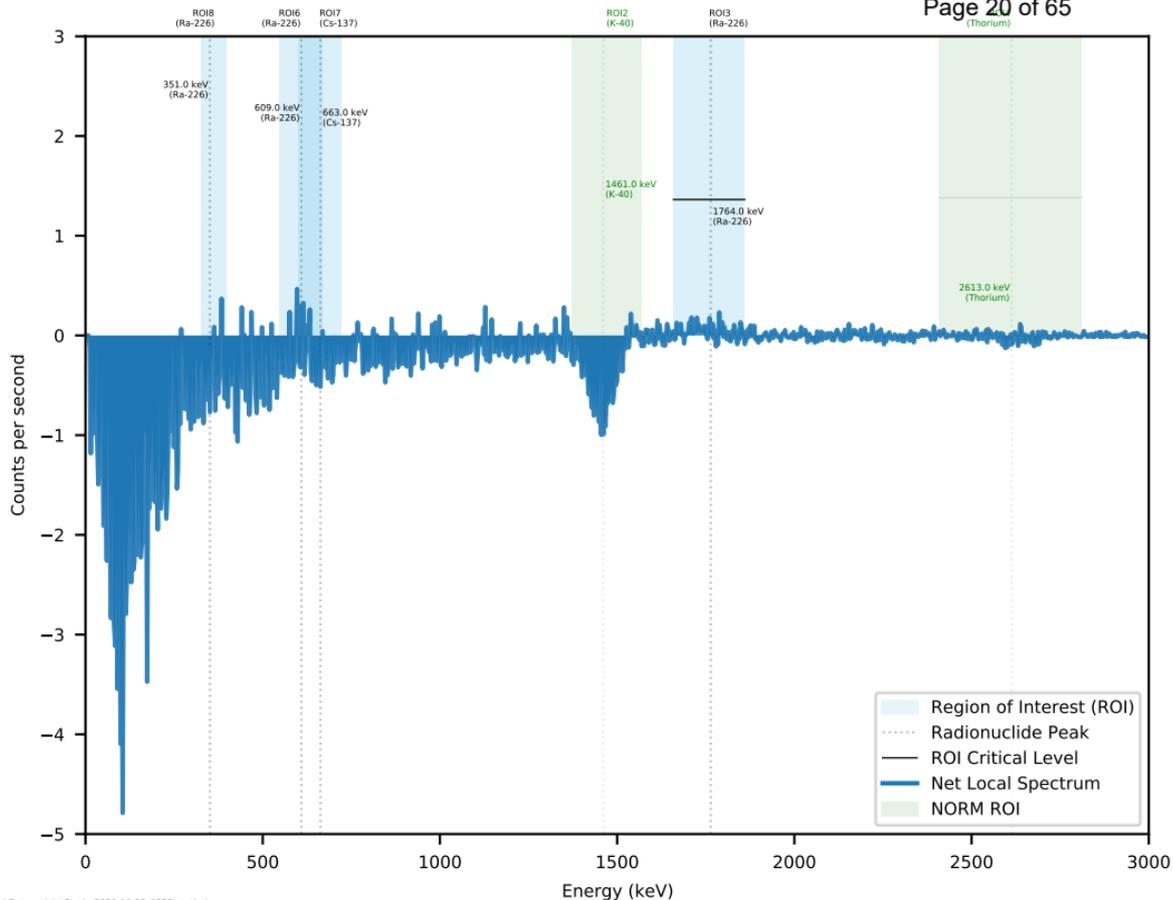


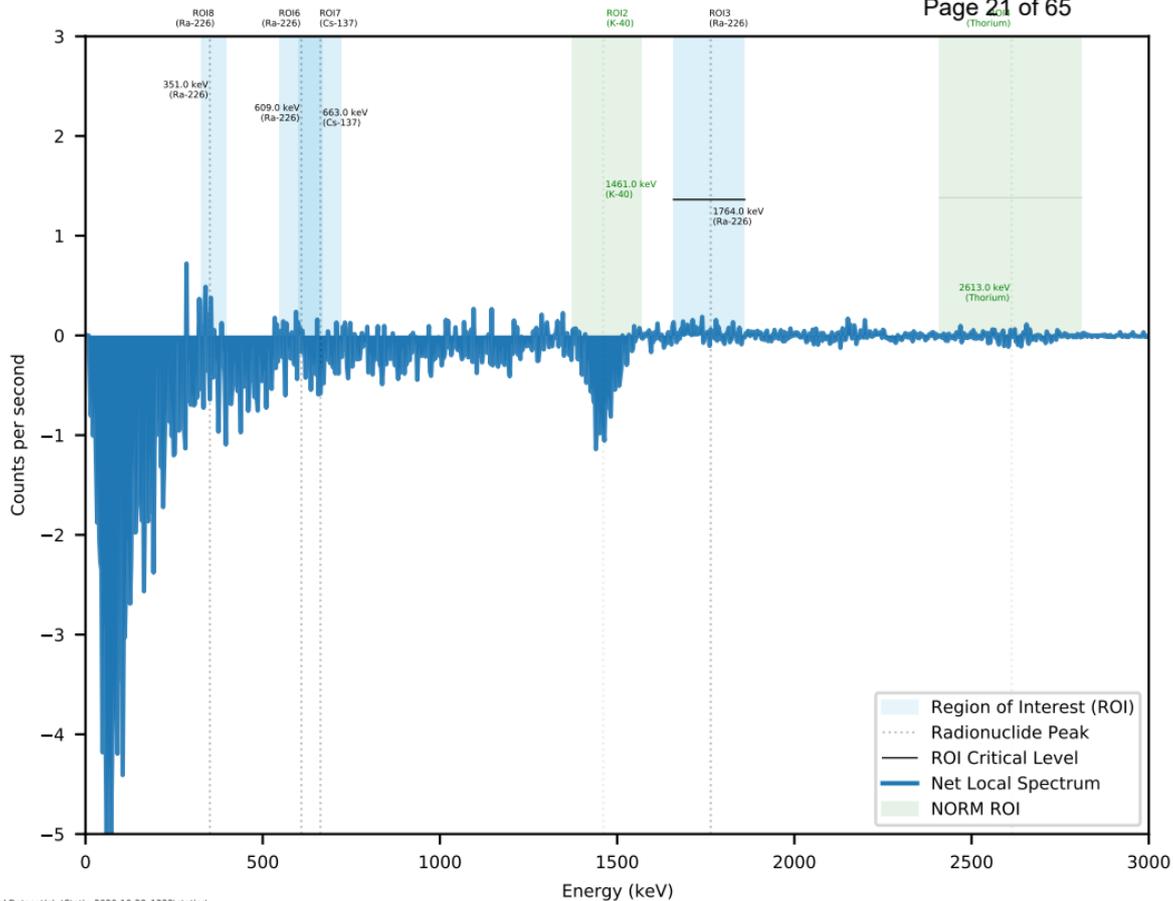


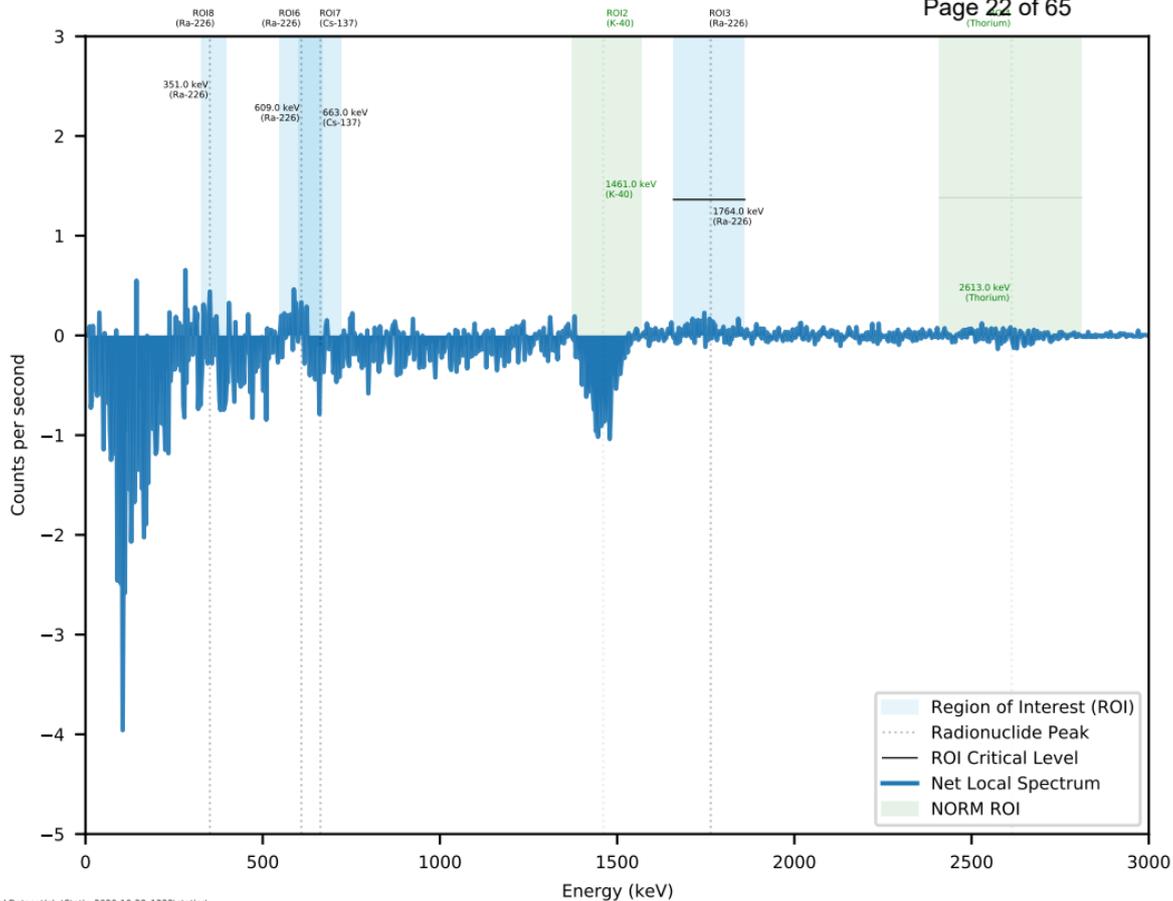


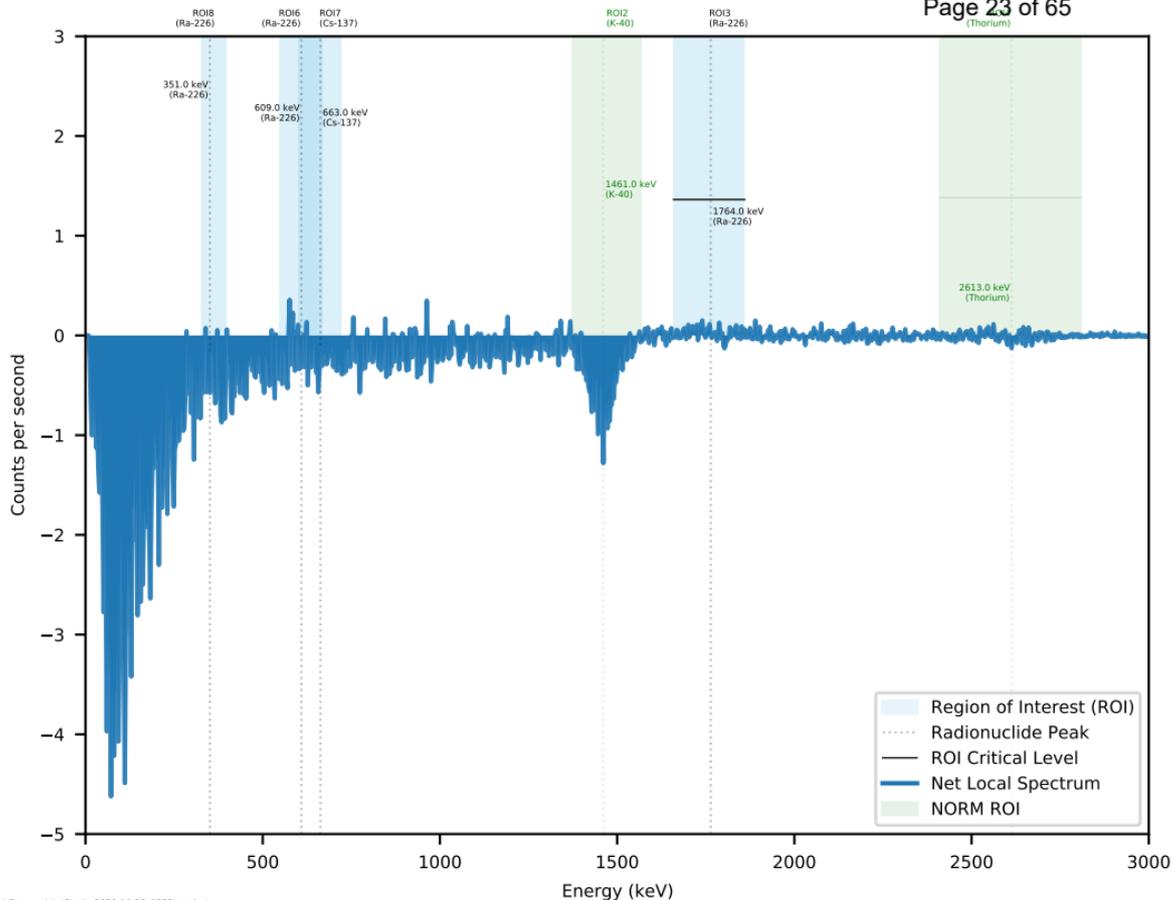


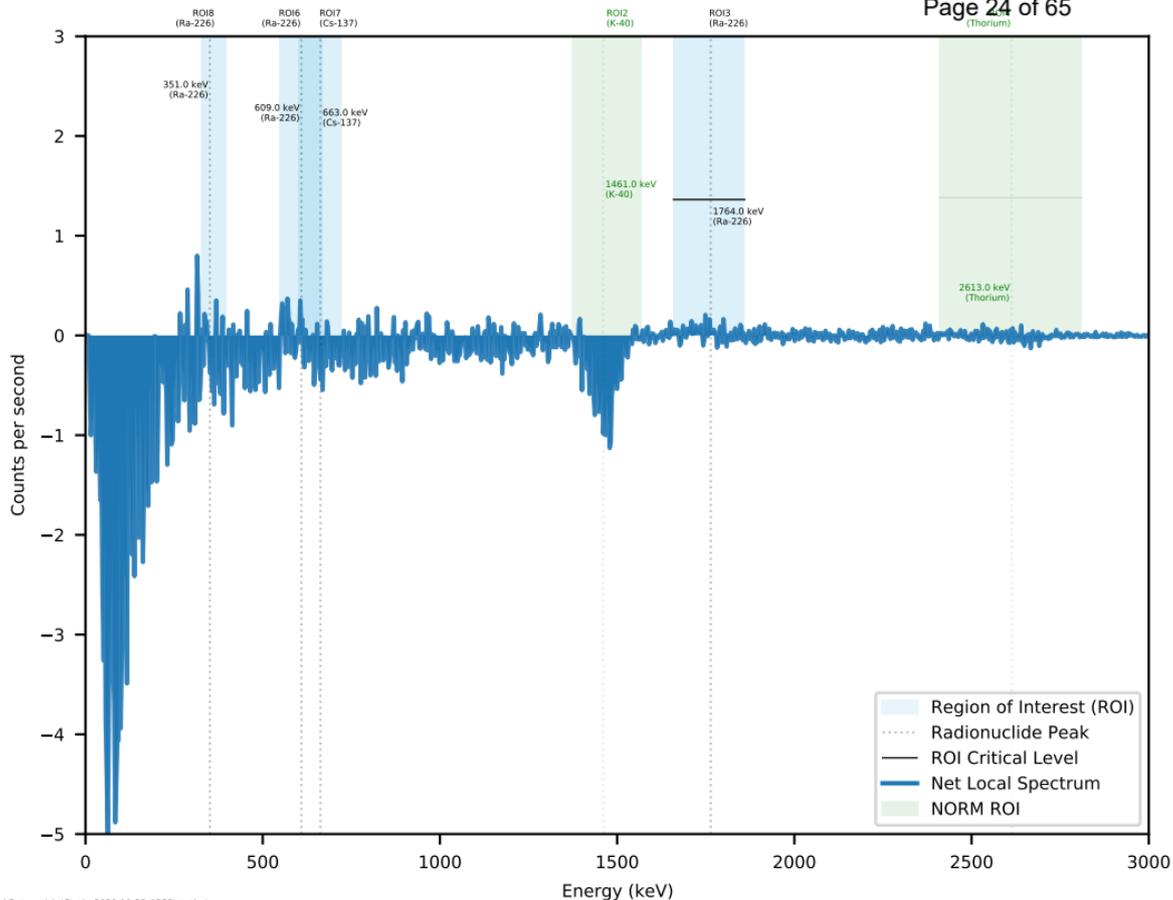


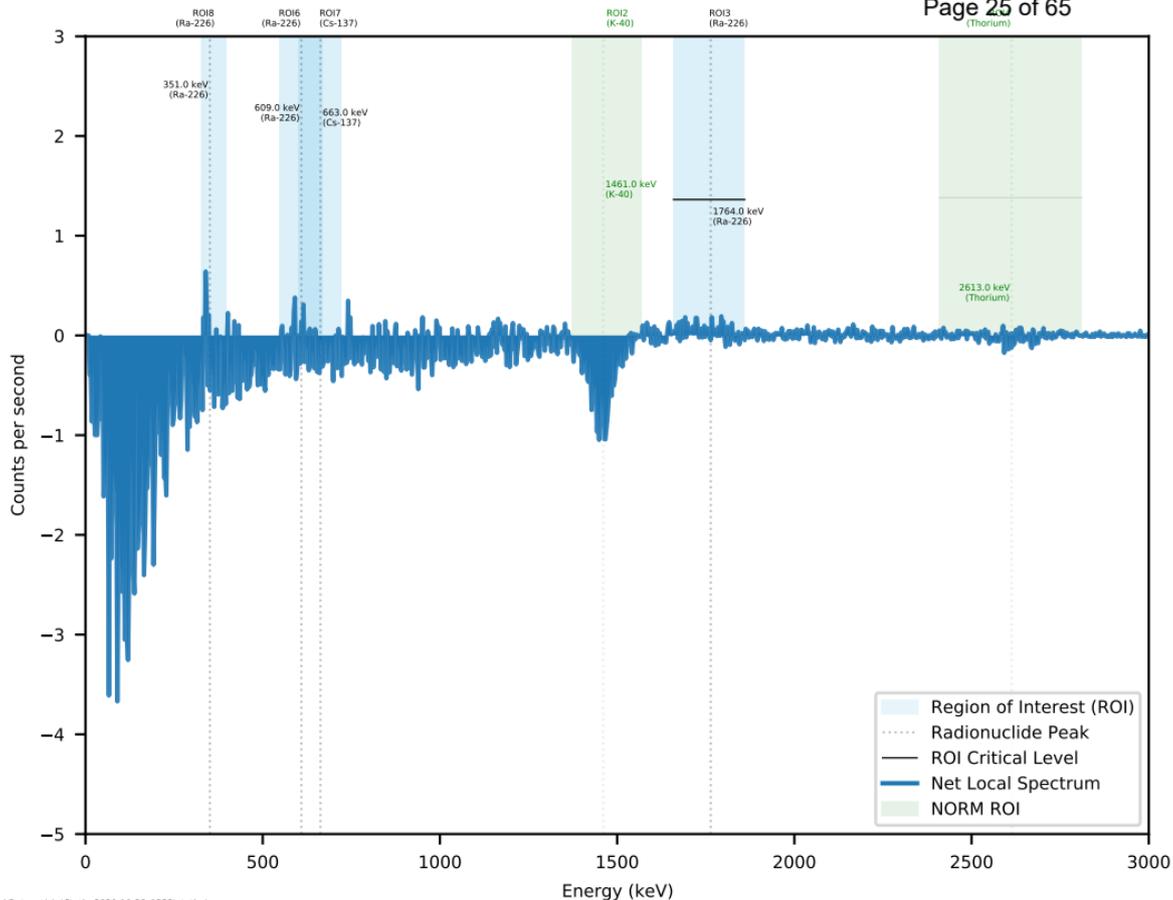


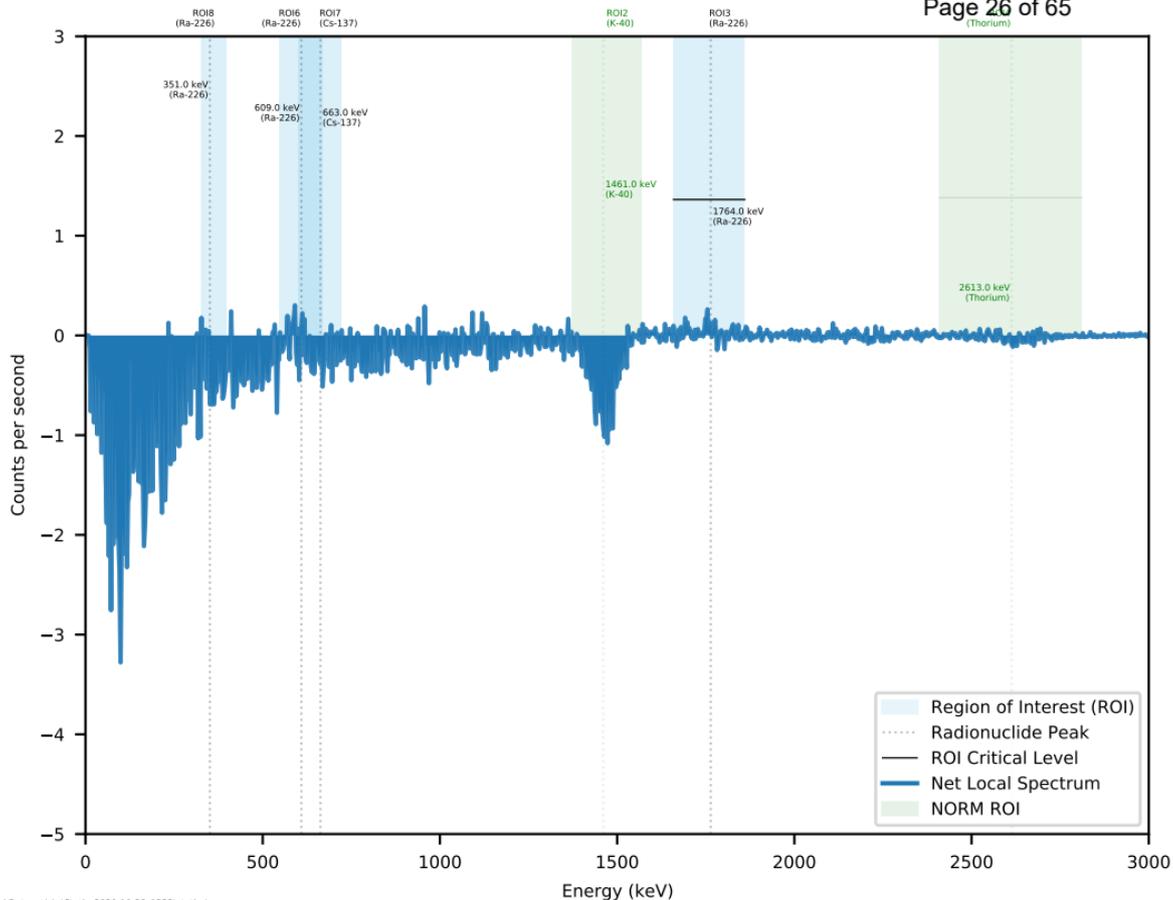


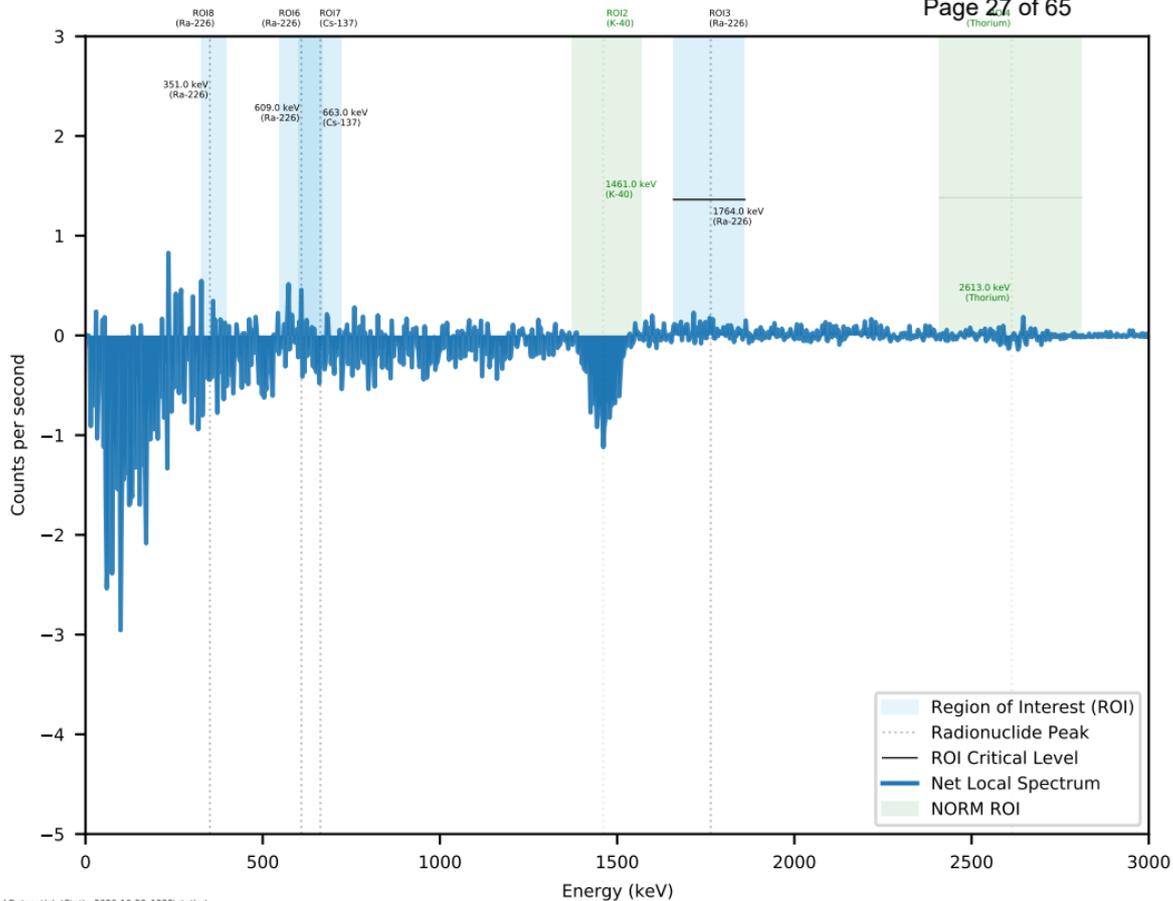


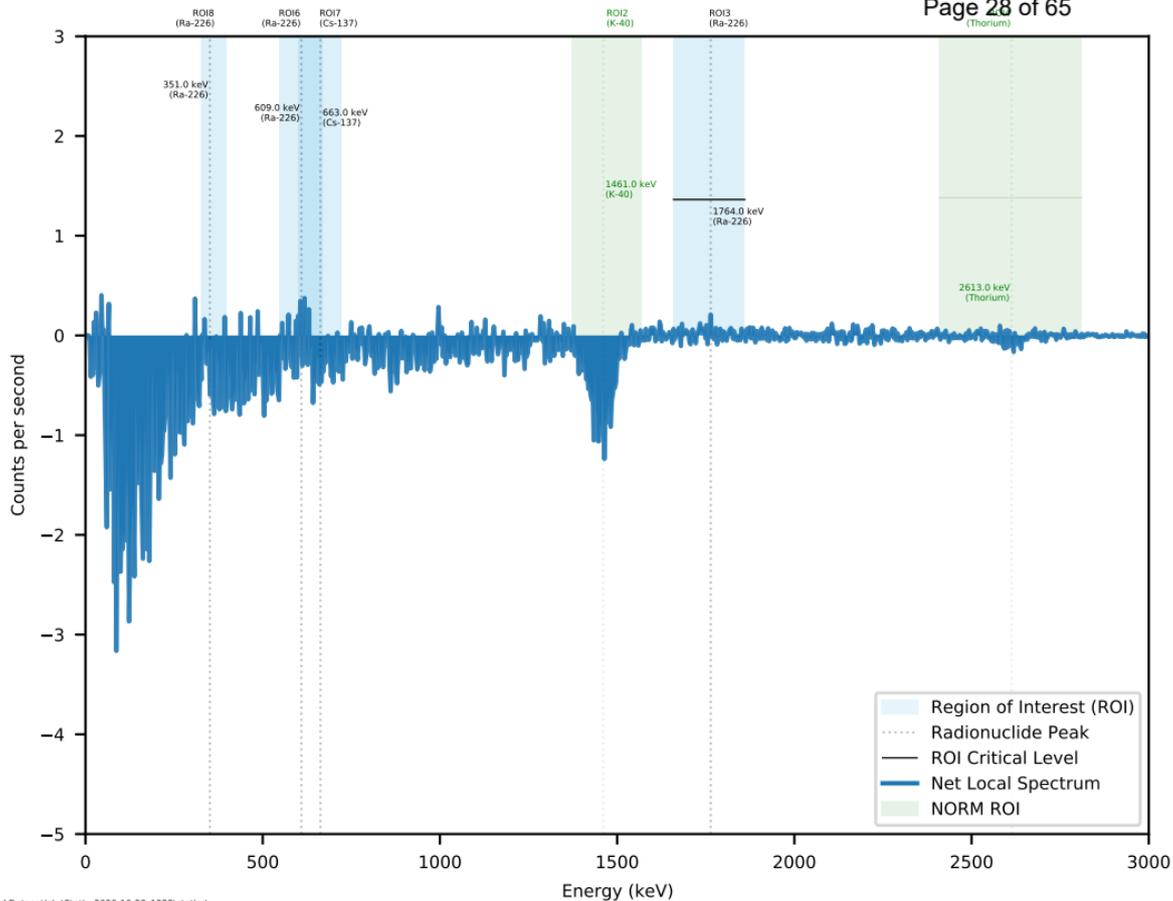


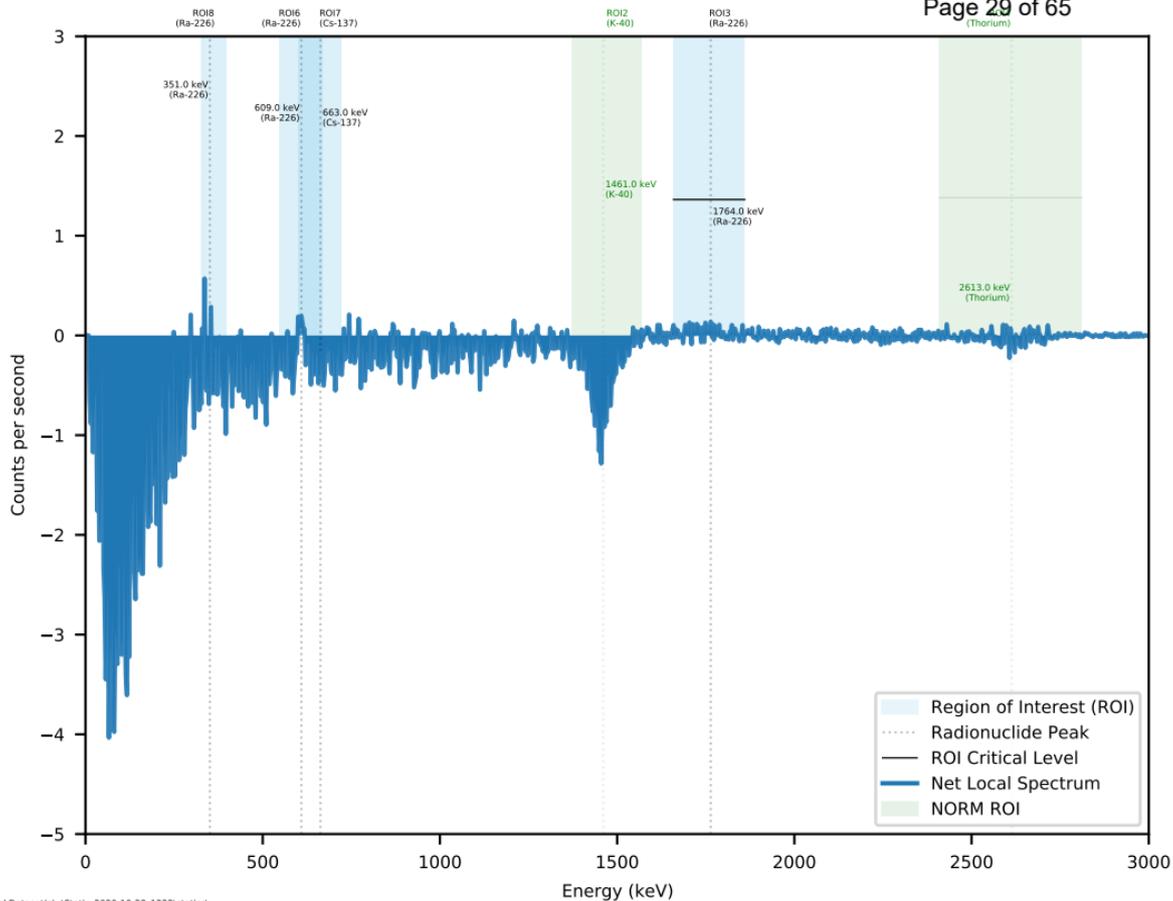


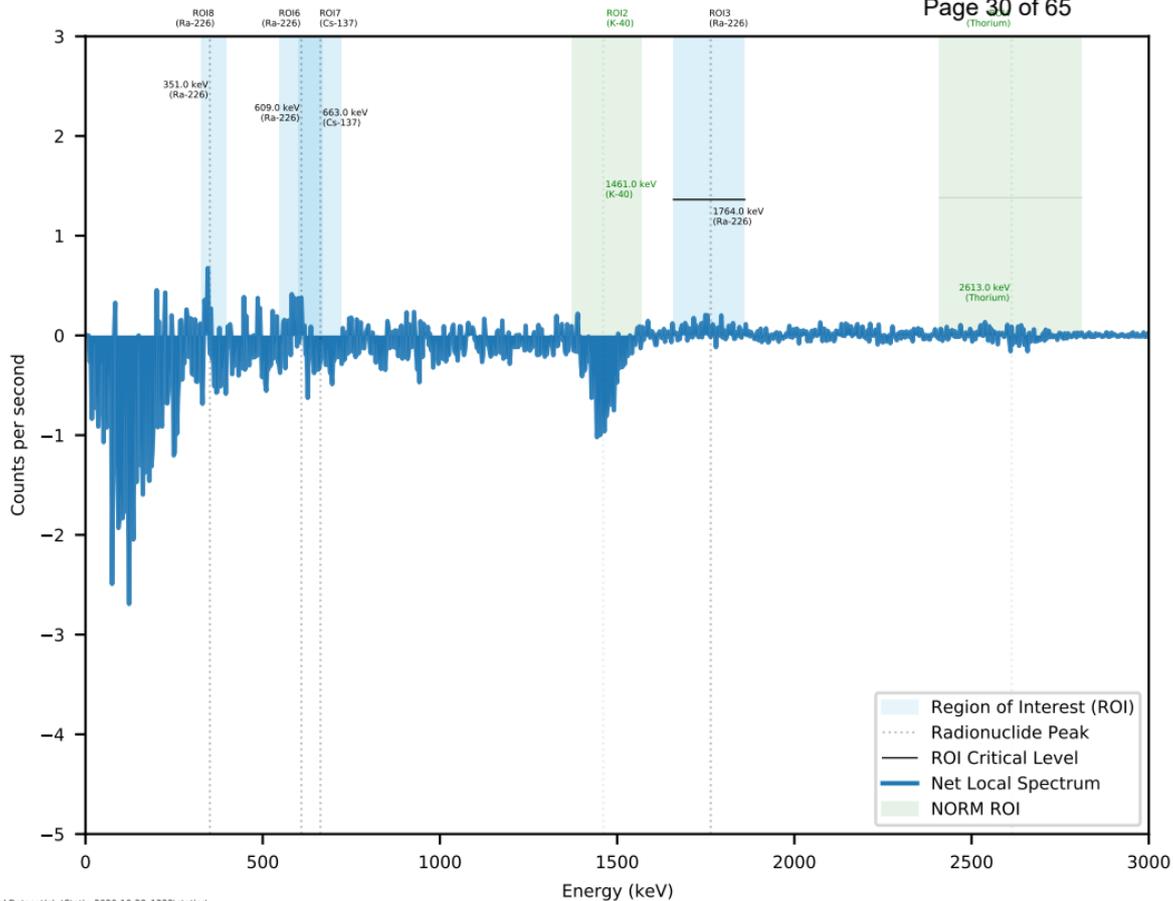














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40199-1
Client Project/Site: HPNS-Parcel G 501197

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/16/2020 10:44:22 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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QC Sample Results	30
QC Association Summary	33
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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Job ID: 160-40199-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40199-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/30/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Job ID: 160-40199-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 17.1 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-ESU-TU098D-001 (160-40199-1), HPPG-ESU-TU098D-011 (160-40199-11), HPPG-ESU-TU098D-021 (160-40199-21), HPPG-ESU-TU098D-B-001 (160-40199-26) and HPPG-F-023 (160-40199-27) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 11/01/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

HPPG-ESU-TU098D-001 (160-40199-1), HPPG-ESU-TU098D-011 (160-40199-11), HPPG-ESU-TU098D-021 (160-40199-21), HPPG-ESU-TU098D-B-001 (160-40199-26) and HPPG-F-023 (160-40199-27). The samples contained rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU098D-001 (160-40199-1), HPPG-ESU-TU098D-002 (160-40199-2), HPPG-ESU-TU098D-003 (160-40199-3), HPPG-ESU-TU098D-004 (160-40199-4), HPPG-ESU-TU098D-005 (160-40199-5), HPPG-ESU-TU098D-006 (160-40199-6), HPPG-ESU-TU098D-007 (160-40199-7), HPPG-ESU-TU098D-008 (160-40199-8), HPPG-ESU-TU098D-009 (160-40199-9), HPPG-ESU-TU098D-010 (160-40199-10), HPPG-ESU-TU098D-011 (160-40199-11), HPPG-ESU-TU098D-012 (160-40199-12), HPPG-ESU-TU098D-013 (160-40199-13), HPPG-ESU-TU098D-014 (160-40199-14), HPPG-ESU-TU098D-015 (160-40199-15), HPPG-ESU-TU098D-016 (160-40199-16), HPPG-ESU-TU098D-017 (160-40199-17), HPPG-ESU-TU098D-018 (160-40199-18), HPPG-ESU-TU098D-019 (160-40199-19), HPPG-ESU-TU098D-020 (160-40199-20), HPPG-ESU-TU098D-021 (160-40199-21), HPPG-ESU-TU098D-022 (160-40199-22), HPPG-ESU-TU098D-023 (160-40199-23), HPPG-ESU-TU098D-024 (160-40199-24), HPPG-ESU-TU098D-025 (160-40199-25), HPPG-ESU-TU098D-B-001 (160-40199-26), HPPG-F-023 (160-40199-27) and HPPG-F-024 (160-40199-28) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/01/2020, prepared on 11/04/2020 and 11/05/2020 and analyzed on 11/26/2020 and 11/27/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 488430

The MB z-score for Co-60 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background,

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Job ID: 160-40199-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-488430/1-A)

The replicate precision for Ac-228/Ra-228/Th-232 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40199-A-8-C DU)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Co-60: (MB 160-488430/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU098D-005 (160-40199-5)

Gamma prep batch 488230

The method blank (MB) z-score associated with Prep Batch 160-488230 is within limits and is stored in the level IV raw data. (MB 160-488230/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU098D-016 (160-40199-16)

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU098D-018 (160-40199-18)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

CHAIN OF CUSTODY

Ref. Document # 501197RSY-022

Page 1 of 4

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/28/2020
Waybill Number: 4957 0225 4318
Lab Destination: Test America (St. Louis Lab)
 13715 Rider Trail North
 Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested:
 Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma
 Strontium-90 (EPA 905 MOD)



160-40199 Chain of Custody

Sample ID	Collection Information		Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Dose Rate uR/hr	Evidence Bag ID	Comment
	Date	Time								
HPPG-ESU-TU098D-001	10/28/2020	10:52	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-002	10/28/2020	10:52	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-003	10/28/2020	10:49	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-004	10/28/2020	10:46	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-005	10/28/2020	10:43	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-006	10/28/2020	10:55	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-007	10/28/2020	10:57	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-008	10/28/2020	11:00	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	

Special Instructions:
 Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g
 21 day ingrowth results only

Turanaround Time: 3-day 10-Day 28-day Other
Method Codes: C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquisher Signature: [Signature]
Relinquisher Date Time: 10/28/2020 15:59
Received Signature: [Signature]
Received Date Time: 10/30/2020 08:58

*** Last 3 transfers shown above - Complete list of transfers on last page *MICHA KORRITZER



Handwritten signature



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc
Andrew Muirri

CHAIN OF CUSTODY

Ref. Document # 501197RSY-022

Page 2 of 4

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/28/2020

Waybill Number: 4457 0225 4318

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information		Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested					Evidence Bag ID	Comment
	Date	Time						Method	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Dose Rate uR/Hr			
HPPG-ESU-TU098D-009	10/28/2020	11:05	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-010	10/28/2020	11:08	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-011	10/28/2020	11:01	G	SO	1		16 oz. plastic jar	X	X				GJ46599775	
HPPG-ESU-TU098D-012	10/28/2020	11:04	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-013	10/28/2020	11:14	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-014	10/28/2020	11:18	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-015	10/28/2020	11:16	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-016	10/28/2020	11:07	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-017	10/28/2020	11:10	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-018	10/28/2020	11:19	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-019	10/28/2020	11:16	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-020	10/28/2020	11:20	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-021	10/28/2020	11:21	G	SO	1		16 oz. plastic jar	X	X				GJ46599775	
HPPG-ESU-TU098D-022	10/28/2020	11:24	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-023	10/28/2020	11:28	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-024	10/28/2020	11:25	G	SO	1		16 oz. plastic jar	X					GJ46599775	
HPPG-ESU-TU098D-025	10/28/2020	11:31	G	SO	1		16 oz. plastic jar	X					GJ46599775	





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin
Sample Tech(s): Paul LeBlanc
Andrew Murri

CHAIN OF CUSTODY

Ref. Document # 501197RSY-022

Page 3 of 4

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/28/2020
Waybill Number: 4957 0225 4318
Lab Destination: Test America (St. Louis Lab)
 13715 Rider Trail North
 Earth City, MO 63046
Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested						Evidence Bag ID	Dose Rate uR/Hr	Comment
	Date	Time	Method						Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
HPPG-ESU-TU098D-B-001	10/28/2020	11:52	G	SO	1	16 oz. plastic jar			X	X							
HPPG-F-023	10/28/2020	10:52	G	SO	1	16 oz. plastic jar			X	X							
HPPG-F-024	10/28/2020	10:49	G	SO	1	16 oz. plastic jar			X								



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All Transfers for COC 501197RSY-022				Page 4 of 4	
Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/28/2020 15:59	SHIPPEDTOLAB		

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40199-1

Login Number: 40199**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Hoerchler, Elizabeth M**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40199-1	HPPG-ESU-TU098D-001	Solid	10/28/20 10:52	10/30/20 08:58	
160-40199-2	HPPG-ESU-TU098D-002	Solid	10/28/20 10:52	10/30/20 08:58	
160-40199-3	HPPG-ESU-TU098D-003	Solid	10/28/20 10:49	10/30/20 08:58	
160-40199-4	HPPG-ESU-TU098D-004	Solid	10/28/20 10:46	10/30/20 08:58	
160-40199-5	HPPG-ESU-TU098D-005	Solid	10/28/20 10:43	10/30/20 08:58	
160-40199-6	HPPG-ESU-TU098D-006	Solid	10/28/20 10:55	10/30/20 08:58	
160-40199-7	HPPG-ESU-TU098D-007	Solid	10/28/20 10:57	10/30/20 08:58	
160-40199-8	HPPG-ESU-TU098D-008	Solid	10/28/20 11:00	10/30/20 08:58	
160-40199-9	HPPG-ESU-TU098D-009	Solid	10/28/20 11:05	10/30/20 08:58	
160-40199-10	HPPG-ESU-TU098D-010	Solid	10/28/20 11:08	10/30/20 08:58	
160-40199-11	HPPG-ESU-TU098D-011	Solid	10/28/20 11:01	10/30/20 08:58	
160-40199-12	HPPG-ESU-TU098D-012	Solid	10/28/20 11:04	10/30/20 08:58	
160-40199-13	HPPG-ESU-TU098D-013	Solid	10/28/20 11:14	10/30/20 08:58	
160-40199-14	HPPG-ESU-TU098D-014	Solid	10/28/20 11:18	10/30/20 08:58	
160-40199-15	HPPG-ESU-TU098D-015	Solid	10/28/20 11:16	10/30/20 08:58	
160-40199-16	HPPG-ESU-TU098D-016	Solid	10/28/20 11:07	10/30/20 08:58	
160-40199-17	HPPG-ESU-TU098D-017	Solid	10/28/20 11:10	10/30/20 08:58	
160-40199-18	HPPG-ESU-TU098D-018	Solid	10/28/20 11:19	10/30/20 08:58	
160-40199-19	HPPG-ESU-TU098D-019	Solid	10/28/20 11:16	10/30/20 08:58	
160-40199-20	HPPG-ESU-TU098D-020	Solid	10/28/20 11:20	10/30/20 08:58	
160-40199-21	HPPG-ESU-TU098D-021	Solid	10/28/20 11:21	10/30/20 08:58	
160-40199-22	HPPG-ESU-TU098D-022	Solid	10/28/20 11:24	10/30/20 08:58	
160-40199-23	HPPG-ESU-TU098D-023	Solid	10/28/20 11:28	10/30/20 08:58	
160-40199-24	HPPG-ESU-TU098D-024	Solid	10/28/20 11:25	10/30/20 08:58	
160-40199-25	HPPG-ESU-TU098D-025	Solid	10/28/20 11:31	10/30/20 08:58	
160-40199-26	HPPG-ESU-TU098D-B-001	Solid	10/28/20 11:52	10/30/20 08:58	
160-40199-27	HPPG-F-023	Solid	10/28/20 10:52	10/30/20 08:58	
160-40199-28	HPPG-F-024	Solid	10/28/20 10:49	10/30/20 08:58	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-001

Lab Sample ID: 160-40199-1

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0362	U	0.0552	0.0553	0.160	0.0424	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	103		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.576		0.306	0.311		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Actinium-227	-0.302	U	0.666	0.667		0.401	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Bismuth-212	0.506	U	0.851	0.853		0.654	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Bismuth-214	0.536		0.150	0.159		0.0593	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Cesium-137	0.0136	U	0.0574	0.0575	0.0700	0.0458	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Lead-210	0.776	U	1.78	1.79		1.18	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Lead-212	0.543		0.105	0.119		0.0469	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Lead-214	0.538		0.149	0.158		0.0637	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Potassium-40	9.50		1.46	1.74		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Protactinium-231	-1.03	U	3.42	3.42		2.79	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Protactinium-234	-0.0607	U	0.335	0.335		0.274	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Radium-226	0.536		0.150	0.159	0.200	0.0593	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Radium-228	0.576		0.306	0.311		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thallium-208	0.243		0.0797	0.0834		0.0300	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thorium 228	0.543		0.105	0.119		0.0469	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thorium-232	0.576		0.306	0.311		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thorium-234	-0.240	U	1.15	1.15		0.953	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Uranium-235	0.000	U	0.217	0.217		0.467	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Uranium-238	-0.240	U	1.15	1.15		0.953	pCi/g	11/05/20 19:07	11/27/20 20:47	1

Client Sample ID: HPPG-ESU-TU098D-002

Lab Sample ID: 160-40199-2

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.403		0.198	0.202		0.0826	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Actinium-227	-0.0144	U	0.0674	0.0674		0.288	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Bismuth-212	-0.232	U	0.673	0.674		0.538	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Bismuth-214	0.543		0.137	0.148		0.0532	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Cesium-137	-0.0382	U	0.0618	0.0620	0.0700	0.0484	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Lead-210	-0.137	U	1.03	1.03		0.837	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Lead-212	0.448		0.0727	0.0930		0.0279	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Lead-214	0.399		0.0999	0.108		0.0404	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Potassium-40	8.89		1.13	1.45		0.0842	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Protactinium-231	0.607	U	1.46	1.46		1.60	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Protactinium-234	-0.0866	U	0.247	0.247		0.201	pCi/g	11/05/20 19:07	11/27/20 20:50	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-002

Lab Sample ID: 160-40199-2

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.543		0.137	0.148	0.200	0.0532	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Radium-228	0.403		0.198	0.202		0.0826	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thallium-208	0.169		0.0502	0.0532		0.0157	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thorium 228	0.448		0.0727	0.0930		0.0279	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thorium-232	0.403		0.198	0.202		0.0826	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thorium-234	0.272	U	0.664	0.665		0.775	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Uranium-235	0.0453	U	0.206	0.206		0.312	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Uranium-238	0.272	U	0.664	0.665		0.775	pCi/g	11/05/20 19:07	11/27/20 20:50	1

Client Sample ID: HPPG-ESU-TU098D-003

Lab Sample ID: 160-40199-3

Date Collected: 10/28/20 10:49

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.338		0.151	0.155		0.137	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Actinium-227	0.227	U	0.342	0.343		0.252	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Bismuth-212	0.385	U	0.796	0.797		0.617	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Bismuth-214	0.437		0.138	0.145		0.0526	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Cesium-137	-0.0258	U	0.0665	0.0665	0.0700	0.0522	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Lead-210	-0.340	U	1.84	1.84		1.52	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Lead-212	0.401		0.107	0.119		0.0629	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Lead-214	0.459		0.124	0.133		0.0436	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Potassium-40	8.19		1.41	1.64		0.142	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Protactinium-231	0.000	U	0.810	0.810		2.69	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Protactinium-234	-0.0231	U	0.0613	0.0613		0.247	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Radium-226	0.437		0.138	0.145	0.200	0.0526	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Radium-228	0.338		0.151	0.155		0.137	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thallium-208	0.139		0.0656	0.0672		0.0281	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thorium 228	0.401		0.107	0.119		0.0629	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thorium-232	0.338		0.151	0.155		0.137	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thorium-234	-0.963	U	0.817	0.824		0.960	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Uranium-235	0.102	U	0.213	0.213		0.441	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Uranium-238	-0.963	U	0.817	0.824		0.960	pCi/g	11/05/20 19:07	11/27/20 20:49	1

Client Sample ID: HPPG-ESU-TU098D-004

Lab Sample ID: 160-40199-4

Date Collected: 10/28/20 10:46

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.341		0.383	0.385		0.194	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Actinium-227	0.143	U	0.490	0.490		0.408	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Bismuth-212	0.483	U	1.04	1.04		0.817	pCi/g	11/05/20 19:07	11/27/20 20:52	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-004

Lab Sample ID: 160-40199-4

Date Collected: 10/28/20 10:46

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.527		0.151	0.163		0.0532	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Cesium-137	0.0219	U	0.0634	0.0635	0.0700	0.0497	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-210	0.759	U	1.35	1.36		1.05	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-212	0.428		0.111	0.122		0.0633	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-214	0.466		0.152	0.161		0.0701	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Potassium-40	7.55		1.41	1.65		0.299	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-231	0.000	U	0.428	0.428		2.46	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-234	0.0112	U	0.0199	0.0200		0.319	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-226	0.527		0.151	0.163	0.200	0.0532	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-228	0.341		0.383	0.385		0.194	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thallium-208	0.117		0.0584	0.0599		0.0264	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium 228	0.428		0.111	0.122		0.0633	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-232	0.341		0.383	0.385		0.194	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-234	-0.559	U	1.02	1.02		0.948	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-235	0.101	U	0.697	0.697		0.572	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-238	-0.559	U	1.02	1.02		0.948	pCi/g	11/05/20 19:07	11/27/20 20:52	1

Client Sample ID: HPPG-ESU-TU098D-005

Lab Sample ID: 160-40199-5

Date Collected: 10/28/20 10:43

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.748		0.214	0.227		0.0370	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Actinium-227	0.0615	U	0.379	0.379		0.313	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-212	-0.613	U	1.14	1.14		0.894	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-214	0.652		0.141	0.155		0.0302	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Cesium-137	-0.0621	U	0.0647	0.0650	0.0700	0.0779	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-210	0.438	U	1.58	1.58		1.27	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-212	0.471		0.0925	0.105		0.0410	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-214	0.403		0.118	0.125		0.0573	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Potassium-40	7.12		1.39	1.57		0.230	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-231	0.789	U	2.00	2.00		2.19	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-234	0.0732	U	0.227	0.227		0.197	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-226	0.652		0.141	0.155	0.200	0.0302	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-228	0.748		0.214	0.227		0.0370	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thallium-208	0.152		0.0610	0.0629		0.0231	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium 228	0.471		0.0925	0.105		0.0410	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-232	0.748		0.214	0.227		0.0370	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-234	-0.194	U	1.03	1.03		0.854	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-235	-0.0377	U	0.0695	0.0696		0.387	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-238	-0.194	U	1.03	1.03		0.854	pCi/g	11/05/20 19:07	11/27/20 21:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-006

Lab Sample ID: 160-40199-6

Date Collected: 10/28/20 10:55

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.373		0.272	0.274		0.152	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Actinium-227	0.0760	U	0.333	0.333		0.369	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Bismuth-212	-0.118	U	0.767	0.767		0.621	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Bismuth-214	0.403		0.124	0.131		0.0479	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Cesium-137	0.0258	U	0.0600	0.0601	0.0700	0.0469	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Lead-210	0.328	U	1.38	1.38		0.966	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Lead-212	0.492		0.103	0.122		0.0531	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Lead-214	0.477		0.115	0.125		0.0523	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Potassium-40	8.62		1.37	1.63		0.307	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Protactinium-231	-0.874	U	3.09	3.09		2.52	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Protactinium-234	0.0677	U	0.106	0.106		0.184	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Radium-226	0.403		0.124	0.131	0.200	0.0479	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Radium-228	0.373		0.272	0.274		0.152	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thallium-208	0.150		0.0826	0.0841		0.0421	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thorium 228	0.492		0.103	0.122		0.0531	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thorium-232	0.373		0.272	0.274		0.152	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thorium-234	0.575		0.523	0.527		0.420	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Uranium-235	-0.0215	U	0.0316	0.0316		0.313	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Uranium-238	0.575		0.523	0.527		0.420	pCi/g	11/05/20 19:07	11/27/20 21:25	1

Client Sample ID: HPPG-ESU-TU098D-007

Lab Sample ID: 160-40199-7

Date Collected: 10/28/20 10:57

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.532		0.318	0.323		0.137	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Actinium-227	-0.0178	U	0.0309	0.0310		0.452	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-212	0.287	U	0.997	0.997		0.792	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-214	0.357		0.136	0.141		0.0610	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Cesium-137	-0.0226	U	0.0863	0.0863	0.0700	0.0672	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-210	1.70		1.36	1.38		0.782	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-212	0.472		0.109	0.125		0.0523	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-214	0.542		0.146	0.156		0.0694	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Potassium-40	7.46		1.75	1.91		0.506	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-231	-0.865	U	3.01	3.02		2.45	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-234	-0.108	U	0.116	0.116		0.223	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-226	0.357		0.136	0.141	0.200	0.0610	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-228	0.532		0.318	0.323		0.137	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thallium-208	0.244		0.0741	0.0783		0.0204	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium 228	0.472		0.109	0.125		0.0523	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-232	0.532		0.318	0.323		0.137	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-234	0.443		0.493	0.496		0.391	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-235	-0.185	U	0.204	0.205		0.341	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-238	0.443		0.493	0.496		0.391	pCi/g	11/05/20 19:07	11/27/20 21:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-008

Lab Sample ID: 160-40199-8

Date Collected: 10/28/20 11:00

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.142	U	0.237	0.237		0.171	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Actinium-227	0.124	U	0.400	0.400		0.388	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Bismuth-212	0.439	U	0.813	0.815		0.635	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Bismuth-214	0.462		0.140	0.148		0.0557	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Cesium-137	-0.00161	U	0.0551	0.0551	0.0700	0.0313	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-210	-1.74	U	1.42	1.44		1.46	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-212	0.347		0.0949	0.105		0.0566	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-214	0.442		0.126	0.134		0.0687	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Potassium-40	9.02		1.35	1.63		0.282	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-231	0.351	U	1.43	1.43		2.22	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-234	0.0634	U	0.225	0.225		0.228	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-226	0.462		0.140	0.148	0.200	0.0557	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-228	0.142	U	0.237	0.237		0.171	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thallium-208	0.121		0.0701	0.0712		0.0349	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium 228	0.347		0.0949	0.105		0.0566	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-232	0.142	U	0.237	0.237		0.171	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-234	-0.321	U	0.751	0.751		0.522	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-235	-0.156	U	0.491	0.491		0.399	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-238	-0.321	U	0.751	0.751		0.522	pCi/g	11/05/20 19:07	11/27/20 20:52	1

Client Sample ID: HPPG-ESU-TU098D-009

Lab Sample ID: 160-40199-9

Date Collected: 10/28/20 11:05

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.410		0.131	0.138		0.0798	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Actinium-227	-0.294	U	0.556	0.557		0.381	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Bismuth-212	0.410	U	0.755	0.756		0.589	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Bismuth-214	0.379		0.109	0.116		0.0504	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Cesium-137	-0.0113	U	0.0521	0.0521	0.0700	0.0418	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Lead-210	-1.70	U	1.13	1.15		1.53	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Lead-212	0.480		0.0851	0.105		0.0342	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Lead-214	0.356		0.101	0.108		0.0448	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Potassium-40	6.72		1.13	1.33		0.264	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Protactinium-231	0.511	U	1.62	1.63		1.78	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Protactinium-234	0.0371	U	0.0682	0.0683		0.257	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Radium-226	0.379		0.109	0.116	0.200	0.0504	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Radium-228	0.410		0.131	0.138		0.0798	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thallium-208	0.208		0.0648	0.0683		0.0236	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thorium 228	0.480		0.0851	0.105		0.0342	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thorium-232	0.410		0.131	0.138		0.0798	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thorium-234	0.312	U	0.522	0.523		0.412	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Uranium-235	-0.183	U	0.599	0.600		0.490	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Uranium-238	0.312	U	0.522	0.523		0.412	pCi/g	11/04/20 18:40	11/26/20 19:08	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-010

Lab Sample ID: 160-40199-10

Date Collected: 10/28/20 11:08

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.395		0.146	0.151		0.0497	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Actinium-227	-0.0469	U	0.522	0.522		0.309	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Bismuth-212	0.211	U	0.534	0.535		0.420	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Bismuth-214	0.441		0.109	0.118		0.0414	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Cesium-137	0.0196	U	0.0391	0.0392	0.0700	0.0301	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Lead-210	0.564	U	1.06	1.07		0.845	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Lead-212	0.461		0.0751	0.0959		0.0286	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Lead-214	0.452		0.0954	0.106		0.0477	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Potassium-40	8.02		1.10	1.37		0.0877	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Protactinium-231	0.000	U	0.270	0.270		1.85	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Protactinium-234	0.0247	U	0.0419	0.0420		0.203	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Radium-226	0.441		0.109	0.118	0.200	0.0414	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Radium-228	0.395		0.146	0.151		0.0497	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thallium-208	0.198		0.0427	0.0474		0.00543	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thorium 228	0.461		0.0751	0.0959		0.0286	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thorium-232	0.395		0.146	0.151		0.0497	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thorium-234	0.315		0.399	0.400		0.310	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Uranium-235	-0.172	U	0.497	0.497		0.405	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Uranium-238	0.315		0.399	0.400		0.310	pCi/g	11/04/20 18:40	11/26/20 19:07	1

Client Sample ID: HPPG-ESU-TU098D-011

Lab Sample ID: 160-40199-11

Date Collected: 10/28/20 11:01

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0105	U	0.0531	0.0531	0.160	0.0445	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.449		0.141	0.149		0.0396	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Actinium-227	0.0381	U	0.146	0.146		0.301	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Bismuth-212	0.430	U	0.773	0.774		0.607	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Bismuth-214	0.457		0.113	0.123		0.0411	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Cesium-137	-0.0321	U	0.0563	0.0564	0.0700	0.0439	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Lead-210	-0.293	U	1.36	1.36		1.11	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Lead-212	0.338		0.0772	0.0888		0.0417	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Lead-214	0.407		0.0845	0.0945		0.0460	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Potassium-40	6.72		1.07	1.27		0.253	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Protactinium-231	0.407	U	1.57	1.57		1.74	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Protactinium-234	0.0998	U	0.0815	0.0821		0.184	pCi/g	11/04/20 18:40	11/27/20 11:23	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-011

Lab Sample ID: 160-40199-11

Date Collected: 10/28/20 11:01

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.457		0.113	0.123	0.200	0.0411	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Radium-228	0.449		0.141	0.149		0.0396	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thallium-208	0.184		0.0468	0.0505		0.0122	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thorium 228	0.338		0.0772	0.0888		0.0417	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thorium-232	0.449		0.141	0.149		0.0396	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thorium-234	-0.362	U	0.404	0.406		0.958	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Uranium-235	0.270	U	0.281	0.282		0.355	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Uranium-238	-0.362	U	0.404	0.406		0.958	pCi/g	11/04/20 18:40	11/27/20 11:23	1

Client Sample ID: HPPG-ESU-TU098D-012

Lab Sample ID: 160-40199-12

Date Collected: 10/28/20 11:04

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.558		0.122	0.134		0.0223	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Actinium-227	0.0179	U	0.0416	0.0416		0.283	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Bismuth-212	-0.221	U	0.730	0.730		0.585	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Bismuth-214	0.343		0.0899	0.0967		0.0350	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Cesium-137	0.0127	U	0.0604	0.0604	0.0700	0.0488	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Lead-210	0.471	U	1.00	1.00		0.798	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Lead-212	0.458		0.0754	0.0959		0.0292	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Lead-214	0.400		0.0995	0.108		0.0418	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Potassium-40	7.55		1.07	1.32		0.0879	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Protactinium-231	0.000	U	0.484	0.484		1.71	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Protactinium-234	-0.0415	U	0.115	0.115		0.214	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Radium-226	0.343		0.0899	0.0967	0.200	0.0350	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Radium-228	0.558		0.122	0.134		0.0223	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thallium-208	0.159		0.0542	0.0566		0.0217	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thorium 228	0.458		0.0754	0.0959		0.0292	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thorium-232	0.558		0.122	0.134		0.0223	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thorium-234	0.205	U	0.415	0.416		0.826	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Uranium-235	0.0885	U	0.179	0.179		0.381	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Uranium-238	0.205	U	0.415	0.416		0.826	pCi/g	11/04/20 18:40	11/27/20 11:25	1

Client Sample ID: HPPG-ESU-TU098D-013

Lab Sample ID: 160-40199-13

Date Collected: 10/28/20 11:14

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.591		0.194	0.203		0.138	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Actinium-227	-0.108	U	0.598	0.598		0.363	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Bismuth-212	0.248	U	0.723	0.724		0.567	pCi/g	11/04/20 18:40	11/27/20 11:31	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-013

Lab Sample ID: 160-40199-13

Date Collected: 10/28/20 11:14

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-214	0.329		0.114	0.119		0.0497	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Cesium-137	0.0250	U	0.0573	0.0573	0.0700	0.0441	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Lead-210	0.990		1.46	1.46		0.950	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Lead-212	0.428		0.0906	0.101		0.0429	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Lead-214	0.419		0.121	0.128		0.102	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Potassium-40	9.21		1.57	1.83		0.228	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Protactinium-231	0.000	U	0.503	0.503		2.25	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Protactinium-234	0.0761	U	0.236	0.236		0.210	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Radium-226	0.329		0.114	0.119	0.200	0.0497	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Radium-228	0.591		0.194	0.203		0.138	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thallium-208	0.227		0.0631	0.0672		0.0159	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thorium 228	0.428		0.0906	0.101		0.0429	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thorium-232	0.591		0.194	0.203		0.138	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thorium-234	0.326	U	0.543	0.544		0.427	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Uranium-235	-0.216	U	0.195	0.196		0.430	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Uranium-238	0.326	U	0.543	0.544		0.427	pCi/g	11/04/20 18:40	11/27/20 11:31	1

Client Sample ID: HPPG-ESU-TU098D-014

Lab Sample ID: 160-40199-14

Date Collected: 10/28/20 11:18

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.355		0.199	0.202		0.0832	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Actinium-227	0.196	U	0.285	0.286		0.304	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Bismuth-212	-0.583	U	0.943	0.945		0.740	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Bismuth-214	0.103	U	0.101	0.101		0.183	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Cesium-137	-0.00490	U	0.0672	0.0672	0.0700	0.0381	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Lead-210	0.506	U	1.26	1.26		0.841	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Lead-212	0.406		0.0812	0.0967		0.0367	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Lead-214	0.186		0.116	0.118		0.0833	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Potassium-40	4.34		0.922	1.02		0.262	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Protactinium-231	0.331	U	1.23	1.23		1.92	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Protactinium-234	-0.0194	U	0.0432	0.0432		0.163	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Radium-226	0.103	U	0.101	0.101	0.200	0.183	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Radium-228	0.355		0.199	0.202		0.0832	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thallium-208	0.168		0.0548	0.0575		0.0203	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thorium 228	0.406		0.0812	0.0967		0.0367	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thorium-232	0.355		0.199	0.202		0.0832	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thorium-234	0.338		0.416	0.418		0.322	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Uranium-235	0.0700	U	0.269	0.269		0.222	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Uranium-238	0.338		0.416	0.418		0.322	pCi/g	11/04/20 18:40	11/27/20 11:34	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-015

Lab Sample ID: 160-40199-15

Date Collected: 10/28/20 11:16

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.605		0.217	0.226		0.130	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Actinium-227	0.124	U	0.428	0.428		0.363	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Bismuth-212	-0.687	U	1.18	1.18		0.917	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Bismuth-214	0.436		0.164	0.170		0.0718	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Cesium-137	0.00978	U	0.0676	0.0676	0.0700	0.0542	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Lead-210	0.448	U	1.16	1.16		0.785	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Lead-212	0.433		0.0997	0.114		0.0460	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Lead-214	0.409		0.130	0.137		0.0548	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Potassium-40	6.51		1.42	1.56		0.281	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Protactinium-231	0.317	U	1.37	1.37		2.07	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Protactinium-234	-0.0910	U	0.243	0.243		0.188	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Radium-226	0.436		0.164	0.170	0.200	0.0718	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Radium-228	0.605		0.217	0.226		0.130	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thallium-208	0.156		0.0697	0.0715		0.0290	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thorium 228	0.433		0.0997	0.114		0.0460	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thorium-232	0.605		0.217	0.226		0.130	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thorium-234	-0.0977	U	0.883	0.883		0.729	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Uranium-235	0.115	U	0.341	0.341		0.275	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Uranium-238	-0.0977	U	0.883	0.883		0.729	pCi/g	11/04/20 18:40	11/27/20 11:32	1

Client Sample ID: HPPG-ESU-TU098D-016

Lab Sample ID: 160-40199-16

Date Collected: 10/28/20 11:07

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.423		0.194	0.199		0.113	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Actinium-227	0.0964	U	0.294	0.294		0.352	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Bismuth-212	0.322	U	1.07	1.07		0.856	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Bismuth-214	0.435		0.123	0.130		0.0398	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Cesium-137	-0.0466	U	0.0654	0.0656	0.0700	0.0705	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Lead-210	2.41		1.72	1.75		1.00	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Lead-212	0.470		0.0859	0.0989		0.0299	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Lead-214	0.446		0.102	0.111		0.0506	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Potassium-40	8.67		1.53	1.76		0.229	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Protactinium-231	-0.803	U	2.74	2.74		2.22	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Protactinium-234	0.132	U	0.264	0.265		0.216	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Radium-226	0.435		0.123	0.130	0.200	0.0398	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Radium-228	0.423		0.194	0.199		0.113	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thallium-208	0.221		0.0735	0.0769		0.0216	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thorium 228	0.470		0.0859	0.0989		0.0299	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thorium-232	0.423		0.194	0.199		0.113	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thorium-234	0.721		0.587	0.592		0.407	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Uranium-235	-0.0438	U	0.284	0.284		0.384	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Uranium-238	0.721		0.587	0.592		0.407	pCi/g	11/04/20 18:40	11/27/20 12:06	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-017

Lab Sample ID: 160-40199-17

Date Collected: 10/28/20 11:10

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.301		0.187	0.190		0.0803	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Actinium-227	-0.105	U	0.444	0.444		0.271	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Bismuth-212	0.000	U	0.307	0.307		0.312	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Bismuth-214	0.294		0.101	0.106		0.0405	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Cesium-137	-0.000945	U	0.0489	0.0489	0.0700	0.0402	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Lead-210	0.405	U	1.03	1.03		0.711	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Lead-212	0.302		0.0732	0.0830		0.0371	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Lead-214	0.297		0.0953	0.100		0.0407	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Potassium-40	5.06		0.968	1.10		0.253	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Protactinium-231	-0.720	U	2.52	2.53		2.06	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Protactinium-234	0.0234	U	0.165	0.165		0.135	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Radium-226	0.294		0.101	0.106	0.200	0.0405	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Radium-228	0.301		0.187	0.190		0.0803	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thallium-208	0.111		0.0627	0.0637		0.0269	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thorium 228	0.302		0.0732	0.0830		0.0371	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thorium-232	0.301		0.187	0.190		0.0803	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thorium-234	0.465		0.391	0.395		0.313	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Uranium-235	0.0643	U	0.153	0.153		0.262	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Uranium-238	0.465		0.391	0.395		0.313	pCi/g	11/04/20 18:40	11/27/20 12:13	1

Client Sample ID: HPPG-ESU-TU098D-018

Lab Sample ID: 160-40199-18

Date Collected: 10/28/20 11:19

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.395		0.169	0.174		0.0918	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Actinium-227	0.229	U	0.499	0.499		0.296	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Bismuth-212	-0.397	U	0.963	0.964		0.754	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Bismuth-214	0.152	U	0.129	0.130		0.239	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Cesium-137	-0.0209	U	0.172	0.172	0.0700	0.0628	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Lead-210	0.487	U	1.26	1.26		0.867	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Lead-212	0.395		0.0903	0.104		0.0376	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Lead-214	0.325		0.118	0.123		0.0989	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Potassium-40	6.40		1.57	1.70		0.468	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Protactinium-231	0.000	U	0.625	0.625		2.08	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Protactinium-234	-0.0849	U	0.141	0.141		0.176	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Radium-226	0.152	U	0.129	0.130	0.200	0.239	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Radium-228	0.395		0.169	0.174		0.0918	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thallium-208	0.0706		0.0758	0.0762		0.0436	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thorium 228	0.395		0.0903	0.104		0.0376	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thorium-232	0.395		0.169	0.174		0.0918	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thorium-234	0.800		0.583	0.589		0.338	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Uranium-235	0.0832	U	0.209	0.209		0.239	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Uranium-238	0.800		0.583	0.589		0.338	pCi/g	11/04/20 18:40	11/27/20 12:08	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-019

Lab Sample ID: 160-40199-19

Date Collected: 10/28/20 11:16

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.589		0.136	0.149		0.0404	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Actinium-227	-0.132	U	0.583	0.583		0.343	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Bismuth-212	0.179	U	0.339	0.339		0.249	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Bismuth-214	0.402		0.104	0.112		0.0400	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Cesium-137	0.0202	U	0.0396	0.0396	0.0700	0.0303	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Lead-210	-0.745	U	1.64	1.64		1.32	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Lead-212	0.518		0.0873	0.110		0.0398	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Lead-214	0.546		0.106	0.120		0.0546	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Potassium-40	8.47		1.20	1.48		0.258	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Protactinium-231	0.000	U	0.283	0.283		1.89	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Protactinium-234	-0.0834	U	0.233	0.233		0.190	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Radium-226	0.402		0.104	0.112	0.200	0.0400	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Radium-228	0.589		0.136	0.149		0.0404	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thallium-208	0.195		0.0449	0.0493		0.00724	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thorium 228	0.518		0.0873	0.110		0.0398	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thorium-232	0.589		0.136	0.149		0.0404	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thorium-234	0.352		0.480	0.482		0.319	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Uranium-235	0.000	U	0.134	0.134		0.332	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Uranium-238	0.352		0.480	0.482		0.319	pCi/g	11/04/20 18:40	11/27/20 12:18	1

Client Sample ID: HPPG-ESU-TU098D-020

Lab Sample ID: 160-40199-20

Date Collected: 10/28/20 11:20

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.505		0.330	0.334		0.148	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Actinium-227	0.193	U	0.448	0.449		0.386	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Bismuth-212	0.366	U	0.809	0.810		0.627	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Bismuth-214	0.364		0.118	0.124		0.0438	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Cesium-137	-0.0202	U	0.0865	0.0866	0.0700	0.0697	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Lead-210	-0.231	U	1.64	1.64		1.35	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Lead-212	0.364		0.108	0.118		0.0648	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Lead-214	0.349		0.120	0.125		0.0519	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Potassium-40	6.61		1.32	1.49		0.154	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Protactinium-231	0.000	U	0.457	0.457		2.32	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Protactinium-234	-0.0316	U	0.103	0.103		0.261	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Radium-226	0.364		0.118	0.124	0.200	0.0438	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Radium-228	0.505		0.330	0.334		0.148	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thallium-208	0.159		0.0542	0.0567		0.0181	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thorium 228	0.364		0.108	0.118		0.0648	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thorium-232	0.505		0.330	0.334		0.148	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thorium-234	-0.153	U	1.31	1.31		1.08	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Uranium-235	-0.00638	U	0.445	0.445		0.366	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Uranium-238	-0.153	U	1.31	1.31		1.08	pCi/g	11/04/20 18:40	11/27/20 12:53	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-021

Lab Sample ID: 160-40199-21

Date Collected: 10/28/20 11:21

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0413	U	0.0675	0.0676	0.160	0.0527	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	101		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.516		0.172	0.180		0.0586	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Actinium-227	0.0404	U	0.0932	0.0933		0.356	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Bismuth-212	0.0377	U	0.696	0.696		0.570	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Bismuth-214	0.376		0.102	0.109		0.0372	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Cesium-137	0.00544	U	0.0604	0.0604	0.0700	0.0493	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Lead-210	-1.34	U	1.66	1.66		1.46	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Lead-212	0.295		0.0913	0.0990		0.0571	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Lead-214	0.458		0.124	0.133		0.0592	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Potassium-40	7.11		1.19	1.39		0.274	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Protactinium-231	-0.727	U	2.17	2.17		1.76	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Protactinium-234	0.0531	U	0.285	0.285		0.233	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Radium-226	0.376		0.102	0.109	0.200	0.0372	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Radium-228	0.516		0.172	0.180		0.0586	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thallium-208	0.194		0.0741	0.0768		0.0292	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thorium 228	0.295		0.0913	0.0990		0.0571	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thorium-232	0.516		0.172	0.180		0.0586	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thorium-234	-0.893	U	0.826	0.832		0.623	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Uranium-235	0.000	U	0.195	0.195		0.397	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Uranium-238	-0.893	U	0.826	0.832		0.623	pCi/g	11/04/20 18:40	11/27/20 12:54	1

Client Sample ID: HPPG-ESU-TU098D-022

Lab Sample ID: 160-40199-22

Date Collected: 10/28/20 11:24

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.455		0.118	0.126		0.0384	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Actinium-227	-0.266	U	0.549	0.550		0.317	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Bismuth-212	0.417	U	0.744	0.746		0.584	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Bismuth-214	0.382		0.114	0.120		0.0478	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Cesium-137	0.00336	U	0.0412	0.0412	0.0700	0.0336	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Lead-210	-0.770	U	1.69	1.70		1.37	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Lead-212	0.473		0.0802	0.101		0.0353	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Lead-214	0.426		0.0840	0.0949		0.0352	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Potassium-40	6.63		1.04	1.24		0.245	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Protactinium-231	0.000	U	0.564	0.564		1.78	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Protactinium-234	0.0712	U	0.204	0.204		0.166	pCi/g	11/04/20 18:40	11/27/20 12:57	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-022

Lab Sample ID: 160-40199-22

Date Collected: 10/28/20 11:24

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.382		0.114	0.120	0.200	0.0478	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Radium-228	0.455		0.118	0.126		0.0384	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thallium-208	0.143		0.0733	0.0748		0.0337	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thorium 228	0.473		0.0802	0.101		0.0353	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thorium-232	0.455		0.118	0.126		0.0384	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thorium-234	-0.0148	U	0.965	0.965		0.795	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Uranium-235	-0.00606	U	0.0107	0.0107		0.343	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Uranium-238	-0.0148	U	0.965	0.965		0.795	pCi/g	11/04/20 18:40	11/27/20 12:57	1

Client Sample ID: HPPG-ESU-TU098D-023

Lab Sample ID: 160-40199-23

Date Collected: 10/28/20 11:28

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.492		0.272	0.277		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Actinium-227	0.230	U	0.536	0.537		0.323	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Bismuth-212	-0.0282	U	0.727	0.727		0.596	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Bismuth-214	0.494		0.153	0.161		0.0618	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Cesium-137	-0.0192	U	0.0809	0.0809	0.0700	0.0435	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Lead-210	2.24		1.68	1.70		0.897	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Lead-212	0.530		0.0923	0.108		0.0341	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Lead-214	0.478		0.123	0.133		0.0460	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Potassium-40	8.69		1.32	1.59		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Protactinium-231	0.0515	U	2.75	2.75		2.26	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Protactinium-234	-0.109	U	0.331	0.331		0.270	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Radium-226	0.494		0.153	0.161	0.200	0.0618	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Radium-228	0.492		0.272	0.277		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thallium-208	0.158		0.0536	0.0559		0.0173	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thorium 228	0.530		0.0923	0.108		0.0341	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thorium-232	0.492		0.272	0.277		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thorium-234	0.955		0.617	0.626		0.413	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Uranium-235	0.0546	U	0.255	0.255		0.490	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Uranium-238	0.955		0.617	0.626		0.413	pCi/g	11/04/20 18:40	11/27/20 13:18	1

Client Sample ID: HPPG-ESU-TU098D-024

Lab Sample ID: 160-40199-24

Date Collected: 10/28/20 11:25

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.512		0.143	0.153		0.0210	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Actinium-227	-0.118	U	0.456	0.456		0.267	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Bismuth-212	0.883		0.369	0.380		0.111	pCi/g	11/04/20 18:40	11/27/20 13:19	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-024

Lab Sample ID: 160-40199-24

Date Collected: 10/28/20 11:25

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.345		0.0945	0.101		0.0383	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Cesium-137	-0.0347	U	0.0553	0.0554	0.0700	0.0430	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Lead-210	-0.169	U	1.17	1.17		0.952	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Lead-212	0.457		0.0727	0.0937		0.0277	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Lead-214	0.311		0.0763	0.0828		0.0414	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Potassium-40	6.40		0.954	1.16		0.0829	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Protactinium-231	0.000	U	0.255	0.255		1.66	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Protactinium-234	-0.0309	U	0.0574	0.0575		0.204	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Radium-226	0.345		0.0945	0.101	0.200	0.0383	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Radium-228	0.512		0.143	0.153		0.0210	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thallium-208	0.164		0.0433	0.0466		0.0105	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thorium 228	0.457		0.0727	0.0937		0.0277	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thorium-232	0.512		0.143	0.153		0.0210	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thorium-234	-0.263	U	0.943	0.943		0.770	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Uranium-235	0.0277	U	0.146	0.146		0.378	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Uranium-238	-0.263	U	0.943	0.943		0.770	pCi/g	11/04/20 18:40	11/27/20 13:19	1

Client Sample ID: HPPG-ESU-TU098D-025

Lab Sample ID: 160-40199-25

Date Collected: 10/28/20 11:31

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.668		0.181	0.196		0.0630	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Actinium-227	0.172	U	0.388	0.389		0.350	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Bismuth-212	0.0328	U	0.819	0.819		0.671	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Bismuth-214	0.469		0.135	0.145		0.0483	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Cesium-137	-0.0289	U	0.0583	0.0584	0.0700	0.0592	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Lead-210	1.65		1.84	1.85		1.12	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Lead-212	0.414		0.106	0.117		0.0588	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Lead-214	0.522		0.148	0.160		0.0594	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Potassium-40	9.37		1.53	1.87		0.289	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Protactinium-231	0.152	U	1.70	1.70		2.63	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Protactinium-234	0.184	U	0.288	0.289		0.271	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Radium-226	0.469		0.135	0.145	0.200	0.0483	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Radium-228	0.668		0.181	0.196		0.0630	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thallium-208	0.173		0.0724	0.0751		0.0311	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thorium 228	0.414		0.106	0.117		0.0588	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thorium-232	0.668		0.181	0.196		0.0630	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thorium-234	-0.0656	U	1.21	1.21		0.993	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Uranium-235	-0.0640	U	0.114	0.114		0.551	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Uranium-238	-0.0656	U	1.21	1.21		0.993	pCi/g	11/04/20 18:40	11/27/20 13:24	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-B-001

Lab Sample ID: 160-40199-26

Date Collected: 10/28/20 11:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0226	U	0.0601	0.0601	0.160	0.0477	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	101		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.571		0.199	0.208		0.137	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Actinium-227	0.508		0.407	0.412		0.206	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Bismuth-212	0.0472	U	0.749	0.749		0.612	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Bismuth-214	0.518		0.177	0.185		0.0717	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Cesium-137	0.0184	U	0.0614	0.0615	0.0700	0.0487	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Lead-210	-0.530	U	1.44	1.44		1.21	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Lead-212	0.373		0.114	0.124		0.0726	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Lead-214	0.381		0.145	0.150		0.0937	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Potassium-40	7.88		1.39	1.61		0.142	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Protactinium-231	0.000	U	0.345	0.345		2.35	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Protactinium-234	0.0156	U	0.0422	0.0423		0.272	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Radium-226	0.518		0.177	0.185	0.200	0.0717	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Radium-228	0.571		0.199	0.208		0.137	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thallium-208	0.146		0.0967	0.0978		0.0391	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thorium 228	0.373		0.114	0.124		0.0726	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thorium-232	0.571		0.199	0.208		0.137	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thorium-234	0.378	U	0.564	0.566		0.470	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Uranium-235	0.0991	U	0.204	0.204		0.480	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Uranium-238	0.378	U	0.564	0.566		0.470	pCi/g	11/04/20 18:40	11/27/20 13:34	1

Client Sample ID: HPPG-F-023

Lab Sample ID: 160-40199-27

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.101	U	0.0536	0.0541	0.160	0.0516	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.354		0.191	0.195		0.0879	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Actinium-227	-0.289	U	0.638	0.639		0.409	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Bismuth-212	0.280	U	0.772	0.772		0.611	pCi/g	11/04/20 18:40	11/27/20 13:35	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-F-023

Lab Sample ID: 160-40199-27

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.430		0.124	0.132		0.0603	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Cesium-137	-0.0269	U	0.0699	0.0700	0.0700	0.0555	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Lead-210	0.464	U	1.45	1.45		0.971	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Lead-212	0.386		0.0978	0.110		0.0562	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Lead-214	0.444		0.127	0.135		0.0563	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Potassium-40	9.04		1.37	1.65		0.290	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Protactinium-231	-0.456	U	2.79	2.79		2.28	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Protactinium-234	-0.102	U	0.324	0.324		0.264	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Radium-226	0.430		0.124	0.132	0.200	0.0603	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Radium-228	0.354		0.191	0.195		0.0879	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thallium-208	0.212		0.0541	0.0584		0.0144	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thorium 228	0.386		0.0978	0.110		0.0562	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thorium-232	0.354		0.191	0.195		0.0879	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thorium-234	-0.631	U	1.04	1.05		0.876	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Uranium-235	0.196	U	0.316	0.316		0.263	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Uranium-238	-0.631	U	1.04	1.05		0.876	pCi/g	11/04/20 18:40	11/27/20 13:35	1

Client Sample ID: HPPG-F-024

Lab Sample ID: 160-40199-28

Date Collected: 10/28/20 10:49

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.576		0.199	0.207		0.0737	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Actinium-227	0.113	U	0.391	0.391		0.313	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Bismuth-212	-0.0928	U	0.909	0.909		0.741	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Bismuth-214	0.511		0.135	0.145		0.0464	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Cesium-137	-0.00254	U	0.0525	0.0525	0.0700	0.0481	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Lead-210	1.23		1.53	1.54		0.964	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Lead-212	0.418		0.0902	0.100		0.0462	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Lead-214	0.512		0.120	0.131		0.0470	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Potassium-40	6.67		1.30	1.46		0.212	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Protactinium-231	0.343	U	1.42	1.42		2.21	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Protactinium-234	-0.0202	U	0.0407	0.0407		0.246	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Radium-226	0.511		0.135	0.145	0.200	0.0464	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Radium-228	0.576		0.199	0.207		0.0737	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thallium-208	0.232		0.0691	0.0730		0.0200	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thorium 228	0.418		0.0902	0.100		0.0462	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thorium-232	0.576		0.199	0.207		0.0737	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thorium-234	-0.899	U	0.583	0.591		0.780	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Uranium-235	-0.0135	U	0.0204	0.0204		0.247	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Uranium-238	-0.899	U	0.583	0.591		0.780	pCi/g	11/04/20 18:40	11/27/20 13:38	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490265/23-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490265

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02016	U	0.0539	0.0539	0.160	0.0460	pCi/g	11/25/20 14:30	12/11/20 07:07	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Sr Carrier	96.3		40 - 110		11/25/20 14:30	12/11/20 07:07	1			

Lab Sample ID: LCS 160-490265/1-A
Matrix: Solid
Analysis Batch: 491444

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490265

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.76	6.013		0.491	0.160	0.0470	pCi/g	77	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Sr Carrier	109		40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488230/1-A
Matrix: Solid
Analysis Batch: 490283

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488230

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-228	-0.05630	U	0.114	0.114		0.183	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Actinium-227	-0.02825	U	0.499	0.499		0.309	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Bismuth-212	-0.6151	U	0.993	0.995		0.758	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Bismuth-214	0.06275	U	0.0418	0.0423		0.171	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Cesium-137	-0.001577	U	0.0413	0.0413	0.0700	0.0337	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Lead-210	1.393		1.56	1.57		1.05	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Lead-212	0.0000	U	0.0589	0.0589		0.0976	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Lead-214	-0.05366	U	0.117	0.117		0.101	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Potassium-40	0.3398		0.304	0.306		0.158	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Protactinium-231	0.0000	U	0.220	0.220		2.38	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Protactinium-234	-0.04318	U	0.130	0.130		0.218	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Radium-226	0.06275	U	0.0418	0.0423	0.200	0.171	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Radium-228	-0.05630	U	0.114	0.114		0.183	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thallium-208	0.02386		0.0509	0.0509		0.0211	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thorium 228	0.0000	U	0.0589	0.0589		0.0976	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thorium-232	-0.05630	U	0.114	0.114		0.183	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thorium-234	0.1407	U	0.479	0.479		0.373	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Uranium-235	0.0000	U	0.0740	0.0740		0.394	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Uranium-238	0.1407	U	0.479	0.479		0.373	pCi/g	11/04/20 18:40	11/26/20 19:06	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488230/2-A
Matrix: Solid
Analysis Batch: 490650

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488230

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	98.18		10.3		0.438	pCi/g	102	87 - 116	
Cesium-137	26.7	24.47		2.61	0.0700	0.101	pCi/g	91	87 - 120	
Cobalt-60	9.50	8.506		0.894		0.0252	pCi/g	89	87 - 115	

Lab Sample ID: 160-40199-28 DU
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: HPPG-F-024
Prep Type: Total/NA
Prep Batch: 488230

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.576		0.4932		0.130		0.0354	pCi/g	0.25	1
Actinium-227	0.113	U	0.01588	U	0.0670		0.269	pCi/g	0.21	1
Bismuth-212	-0.0928	U	-0.1551	U	0.649		0.524	pCi/g	0.04	1
Bismuth-214	0.511		0.3688		0.104		0.0387	pCi/g	0.57	1
Cesium-137	-0.00254	U	0.001939	U	0.0439	0.0700	0.0360	pCi/g	0.05	1
Lead-210	1.23		0.1639	U	1.03		0.836	pCi/g	0.42	1
Lead-212	0.418		0.4793		0.0988		0.0332	pCi/g	0.31	1
Lead-214	0.512		0.3444		0.0916		0.0434	pCi/g	0.75	1
Potassium-40	6.67		7.525		1.31		0.226	pCi/g	0.31	1
Protactinium-231	0.343	U	0.3825	U	1.41		1.65	pCi/g	0.01	1
Protactinium-234	-0.0202	U	-0.03179	U	0.0908		0.197	pCi/g	0.09	1
Radium-226	0.511		0.3688		0.104	0.200	0.0387	pCi/g	0.57	1
Radium-228	0.576		0.4932		0.130		0.0354	pCi/g	0.25	1
Thallium-208	0.232		0.1905		0.0482		0.0109	pCi/g	0.34	1
Thorium 228	0.418		0.4793		0.0988		0.0332	pCi/g	0.31	1
Thorium-232	0.576		0.4932		0.130		0.0354	pCi/g	0.25	1
Thorium-234	-0.899	U	-0.3329	U	0.265		0.866	pCi/g	0.66	1
Uranium-235	-0.0135	U	0.09482	U	0.192		0.367	pCi/g	0.51	1
Uranium-238	-0.899	U	-0.3329	U	0.265		0.866	pCi/g	0.66	1

Lab Sample ID: MB 160-488430/1-A
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488430

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.1242	U	0.470	0.470		0.273	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-212	0.3039	U	0.553	0.554		0.417	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-214	-0.05711	U	0.141	0.141		0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Cesium-137	-0.02341	U	0.0487	0.0487	0.0700	0.0374	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-210	-0.03139	U	0.832	0.832		0.682	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-212	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-214	-0.09519	U	0.108	0.108		0.0715	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Potassium-40	0.005577	U	0.404	0.404		0.324	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-231	0.07444	U	0.900	0.900		1.39	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-234	0.01098	U	0.155	0.155		0.127	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Radium-226	-0.05711	U	0.141	0.141	0.200	0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-488430/1-A
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488430

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thallium-208	0.01737	U	0.0439	0.0439		0.0237	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium 228	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium-232	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium-234	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Uranium-235	-0.006199	U	0.0105	0.0105		0.215	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Uranium-238	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09	1

Lab Sample ID: LCS 160-488430/2-A
Matrix: Solid
Analysis Batch: 490333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488430

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	97.59		11.5		0.634	pCi/g	101	87 - 116
Cesium-137	26.8	29.30		3.08	0.0700	0.128	pCi/g	110	87 - 120
Cobalt-60	9.52	10.55		1.17		0.0583	pCi/g	111	87 - 115

Lab Sample ID: 160-40199-8 DU
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: HPPG-ESU-TU098D-008
Prep Type: Total/NA
Prep Batch: 488430

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					Limit
Actinium 228	0.142	U	0.6143		0.173		0.0389	pCi/g	1.15	1
Actinium-227	0.124	U	0.2185	U	0.429		0.245	pCi/g	0.11	1
Bismuth-212	0.439	U	0.0000	U	0.512		0.501	pCi/g	0.33	1
Bismuth-214	0.462		0.3643		0.117		0.0454	pCi/g	0.37	1
Cesium-137	-0.00161	U	0.004350	U	0.0411	0.0700	0.0334	pCi/g	0.06	1
Lead-210	-1.74	U	0.2284	U	1.02		0.826	pCi/g	0.80	1
Lead-212	0.347		0.4648		0.102		0.0385	pCi/g	0.57	1
Lead-214	0.442		0.4276		0.0983		0.0411	pCi/g	0.06	1
Potassium-40	9.02		8.015		1.41		0.248	pCi/g	0.33	1
Protactinium-231	0.351	U	-0.7193	U	2.35		1.91	pCi/g	0.28	1
Protactinium-234	0.0634	U	0.005267	U	0.00980		0.196	pCi/g	0.25	1
Radium-226	0.462		0.3643		0.117	0.200	0.0454	pCi/g	0.37	1
Radium-228	0.142	U	0.6143		0.173		0.0389	pCi/g	1.15	1
Thallium-208	0.121		0.1466		0.0462		0.0144	pCi/g	0.21	1
Thorium 228	0.347		0.4648		0.102		0.0385	pCi/g	0.57	1
Thorium-232	0.142	U	0.6143		0.173		0.0389	pCi/g	1.15	1
Thorium-234	-0.321	U	-0.3628	U	0.264		0.976	pCi/g	0.04	1
Uranium-235	-0.156	U	0.0000	U	0.188		0.343	pCi/g	0.23	1
Uranium-238	-0.321	U	-0.3628	U	0.264		0.976	pCi/g	0.04	1

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Rad

Leach Batch: 487644

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-1	HPPG-ESU-TU098D-001	Total/NA	Solid	Dry and Grind	
160-40199-2	HPPG-ESU-TU098D-002	Total/NA	Solid	Dry and Grind	
160-40199-3	HPPG-ESU-TU098D-003	Total/NA	Solid	Dry and Grind	
160-40199-4	HPPG-ESU-TU098D-004	Total/NA	Solid	Dry and Grind	
160-40199-5	HPPG-ESU-TU098D-005	Total/NA	Solid	Dry and Grind	
160-40199-6	HPPG-ESU-TU098D-006	Total/NA	Solid	Dry and Grind	
160-40199-7	HPPG-ESU-TU098D-007	Total/NA	Solid	Dry and Grind	
160-40199-8	HPPG-ESU-TU098D-008	Total/NA	Solid	Dry and Grind	
160-40199-9	HPPG-ESU-TU098D-009	Total/NA	Solid	Dry and Grind	
160-40199-10	HPPG-ESU-TU098D-010	Total/NA	Solid	Dry and Grind	
160-40199-11	HPPG-ESU-TU098D-011	Total/NA	Solid	Dry and Grind	
160-40199-12	HPPG-ESU-TU098D-012	Total/NA	Solid	Dry and Grind	
160-40199-13	HPPG-ESU-TU098D-013	Total/NA	Solid	Dry and Grind	
160-40199-14	HPPG-ESU-TU098D-014	Total/NA	Solid	Dry and Grind	
160-40199-15	HPPG-ESU-TU098D-015	Total/NA	Solid	Dry and Grind	
160-40199-16	HPPG-ESU-TU098D-016	Total/NA	Solid	Dry and Grind	
160-40199-17	HPPG-ESU-TU098D-017	Total/NA	Solid	Dry and Grind	
160-40199-18	HPPG-ESU-TU098D-018	Total/NA	Solid	Dry and Grind	
160-40199-19	HPPG-ESU-TU098D-019	Total/NA	Solid	Dry and Grind	
160-40199-20	HPPG-ESU-TU098D-020	Total/NA	Solid	Dry and Grind	
160-40199-8 DU	HPPG-ESU-TU098D-008	Total/NA	Solid	Dry and Grind	

Leach Batch: 487645

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-21	HPPG-ESU-TU098D-021	Total/NA	Solid	Dry and Grind	
160-40199-22	HPPG-ESU-TU098D-022	Total/NA	Solid	Dry and Grind	
160-40199-23	HPPG-ESU-TU098D-023	Total/NA	Solid	Dry and Grind	
160-40199-24	HPPG-ESU-TU098D-024	Total/NA	Solid	Dry and Grind	
160-40199-25	HPPG-ESU-TU098D-025	Total/NA	Solid	Dry and Grind	
160-40199-26	HPPG-ESU-TU098D-B-001	Total/NA	Solid	Dry and Grind	
160-40199-27	HPPG-F-023	Total/NA	Solid	Dry and Grind	
160-40199-28	HPPG-F-024	Total/NA	Solid	Dry and Grind	
160-40199-28 DU	HPPG-F-024	Total/NA	Solid	Dry and Grind	

Prep Batch: 488230

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-9	HPPG-ESU-TU098D-009	Total/NA	Solid	Fill_Geo-21	487644
160-40199-10	HPPG-ESU-TU098D-010	Total/NA	Solid	Fill_Geo-21	487644
160-40199-11	HPPG-ESU-TU098D-011	Total/NA	Solid	Fill_Geo-21	487644
160-40199-12	HPPG-ESU-TU098D-012	Total/NA	Solid	Fill_Geo-21	487644
160-40199-13	HPPG-ESU-TU098D-013	Total/NA	Solid	Fill_Geo-21	487644
160-40199-14	HPPG-ESU-TU098D-014	Total/NA	Solid	Fill_Geo-21	487644
160-40199-15	HPPG-ESU-TU098D-015	Total/NA	Solid	Fill_Geo-21	487644
160-40199-16	HPPG-ESU-TU098D-016	Total/NA	Solid	Fill_Geo-21	487644
160-40199-17	HPPG-ESU-TU098D-017	Total/NA	Solid	Fill_Geo-21	487644
160-40199-18	HPPG-ESU-TU098D-018	Total/NA	Solid	Fill_Geo-21	487644
160-40199-19	HPPG-ESU-TU098D-019	Total/NA	Solid	Fill_Geo-21	487644
160-40199-20	HPPG-ESU-TU098D-020	Total/NA	Solid	Fill_Geo-21	487644
160-40199-21	HPPG-ESU-TU098D-021	Total/NA	Solid	Fill_Geo-21	487645
160-40199-22	HPPG-ESU-TU098D-022	Total/NA	Solid	Fill_Geo-21	487645
160-40199-23	HPPG-ESU-TU098D-023	Total/NA	Solid	Fill_Geo-21	487645

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Rad (Continued)

Prep Batch: 488230 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-24	HPPG-ESU-TU098D-024	Total/NA	Solid	Fill_Geo-21	487645
160-40199-25	HPPG-ESU-TU098D-025	Total/NA	Solid	Fill_Geo-21	487645
160-40199-26	HPPG-ESU-TU098D-B-001	Total/NA	Solid	Fill_Geo-21	487645
160-40199-27	HPPG-F-023	Total/NA	Solid	Fill_Geo-21	487645
160-40199-28	HPPG-F-024	Total/NA	Solid	Fill_Geo-21	487645
MB 160-488230/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488230/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40199-28 DU	HPPG-F-024	Total/NA	Solid	Fill_Geo-21	487645

Prep Batch: 488430

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-1	HPPG-ESU-TU098D-001	Total/NA	Solid	Fill_Geo-21	487644
160-40199-2	HPPG-ESU-TU098D-002	Total/NA	Solid	Fill_Geo-21	487644
160-40199-3	HPPG-ESU-TU098D-003	Total/NA	Solid	Fill_Geo-21	487644
160-40199-4	HPPG-ESU-TU098D-004	Total/NA	Solid	Fill_Geo-21	487644
160-40199-5	HPPG-ESU-TU098D-005	Total/NA	Solid	Fill_Geo-21	487644
160-40199-6	HPPG-ESU-TU098D-006	Total/NA	Solid	Fill_Geo-21	487644
160-40199-7	HPPG-ESU-TU098D-007	Total/NA	Solid	Fill_Geo-21	487644
160-40199-8	HPPG-ESU-TU098D-008	Total/NA	Solid	Fill_Geo-21	487644
MB 160-488430/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488430/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40199-8 DU	HPPG-ESU-TU098D-008	Total/NA	Solid	Fill_Geo-21	487644

Prep Batch: 490265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-1	HPPG-ESU-TU098D-001	Total/NA	Solid	DPS-0	487644
160-40199-11	HPPG-ESU-TU098D-011	Total/NA	Solid	DPS-0	487644
160-40199-21	HPPG-ESU-TU098D-021	Total/NA	Solid	DPS-0	487645
160-40199-26	HPPG-ESU-TU098D-B-001	Total/NA	Solid	DPS-0	487645
160-40199-27	HPPG-F-023	Total/NA	Solid	DPS-0	487645
MB 160-490265/23-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490265/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40199-1	HPPG-ESU-TU098D-001	103	
160-40199-11	HPPG-ESU-TU098D-011	102	
160-40199-21	HPPG-ESU-TU098D-021	101	
160-40199-26	HPPG-ESU-TU098D-B-001	101	
160-40199-27	HPPG-F-023	102	
LCS 160-490265/1-A	Lab Control Sample	109	
MB 160-490265/23-A	Method Blank	96.3	

Tracer/Carrier Legend

Sr = Sr Carrier

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 29 Lift 2	Soil Origin: Former Building Sites 317, 364, and 365 SU28B
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 12/18/2020

Systematic Soil Sample Data: RSY 29 Lift 2									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-317364365-SU28B-001	1	Systematic	11,091	15,658	0.516	-0.0304	0.0539	0.0171	0.00847
HPPG-317364365-SU28B-002	2	Systematic	10,769	15,658	0.403	0.0324	N/A	N/A	N/A
HPPG-317364365-SU28B-003	3	Systematic	11,271	15,658	0.0759	0.0243	N/A	N/A	N/A
HPPG-317364365-SU28B-004	4	Systematic	11,023	15,658	0.237	0.0347	N/A	N/A	N/A
HPPG-317364365-SU28B-005	5	Systematic	10,617	15,658	0.337	-0.0511	N/A	N/A	N/A
HPPG-317364365-SU28B-006	6	Systematic	11,150	15,658	0.309	0.00933	N/A	N/A	N/A
HPPG-317364365-SU28B-007	7	Systematic	11,041	15,658	0.431	-0.0497	N/A	N/A	N/A
HPPG-317364365-SU28B-008	8	Systematic	11,163	15,658	0.338	-0.0276	N/A	N/A	N/A
HPPG-317364365-SU28B-009	9	Systematic	10,576	15,658	0.364	-0.0169	N/A	N/A	N/A
HPPG-317364365-SU28B-010	10	Systematic	10,991	15,658	0.262	0.0119	N/A	N/A	N/A
HPPG-317364365-SU28B-011	11	Systematic	10,916	15,658	0.261	0.0443	0.000549	0.0283	0.00662
HPPG-317364365-SU28B-012	12	Systematic	10,813	15,658	0.280	0.00195	N/A	N/A	N/A
HPPG-317364365-SU28B-013	13	Systematic	10,576	15,658	0.411	0.0247	N/A	N/A	N/A
HPPG-317364365-SU28B-014	14	Systematic	11,284	15,658	0.0622	0.00399	N/A	N/A	N/A
HPPG-317364365-SU28B-015	15	Systematic	10,911	15,658	0.393	-0.0096	N/A	N/A	N/A
HPPG-317364365-SU28B-016	16	Systematic	10,654	15,658	0.355	-0.0198	N/A	N/A	N/A
HPPG-317364365-SU28B-017	17	Systematic	10,972	15,658	0.318	-0.0273	N/A	N/A	N/A
HPPG-317364365-SU28B-018	18	Systematic	10,855	15,658	0.215	0.0242	N/A	N/A	N/A
HPPG-317364365-SU28B-019	19	Systematic	11,196	15,658	0.384	0.0138	N/A	N/A	N/A
HPPG-317364365-SU28B-020	20	Systematic	10,932	15,658	0.262	-0.0402	N/A	N/A	N/A
HPPG-317364365-SU28B-021	21	Systematic	11,267	15,658	0.077	0.0170	0.0445	0.00794	0.00775
HPPG-317364365-SU28B-022	22	Systematic	10,855	15,658	0.329	-0.0207	N/A	N/A	N/A
HPPG-317364365-SU28B-023	23	Systematic	10,657	15,658	0.320	0.0153	N/A	N/A	N/A
HPPG-317364365-SU28B-024	24	Systematic	10,823	15,658	0.344	0.0188	N/A	N/A	N/A
HPPG-317364365-SU28B-025	25	Systematic	11,244	15,658	0.450	0.0184	N/A	N/A	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Maximum					0.516	0.0443	0.0539	0.0283	0.00847
Mean					0.3094	0.0001	0.033	0.0178	0.00761
Median					0.329	0.0093	0.0445	0.0171	0.00775
Minimum					0.0622	-0.0511	0.0005	0.00794	0.00662
Standard Deviation					0.1134	0.0274	0.0285	N/A	N/A

Biased Soil Sample Data: RSY 29 Lift 2									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-317364365-SU28B-B-001	1	Biased	10,994	15,658	0.345	-0.0169	0.0108	0.0235	0.00602

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10262020-PG-ROV-235	10/26/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10272020-PG-JSS-240	10/27/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10272020-PG-JSS-238	10/27/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10272020-PG-JSS-239	10/27/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 29 Lift 2
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 28 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 28 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-41.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 42-77). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium, Uranium-235, and Plutonium-239. These results are also included in the TestAmerica sample results report (pages 42-77). Samples HPPG-F-021 and HPPG-F-022 are field duplicates, correlating to systematic samples -004 and -014. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 78-94). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 29 Lift 2 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation Former Building Sites 317, 364, 365 SU 28.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for Former Building Sites 317, 364, 365 SU 28.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-29-U2				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	28.06	13.30	13.03	3.67
ROI-06	60.13	130.30	92.37	92.19	9.80
ROI-07	48.09	102.22	71.83	71.17	8.72
ROI-08	73.16	155.34	115.57	115.25	11.17
ROI-10	2,119.28	2,588.88	2,341.21	2,338.96	65.69

Statistical Summary Reference Background

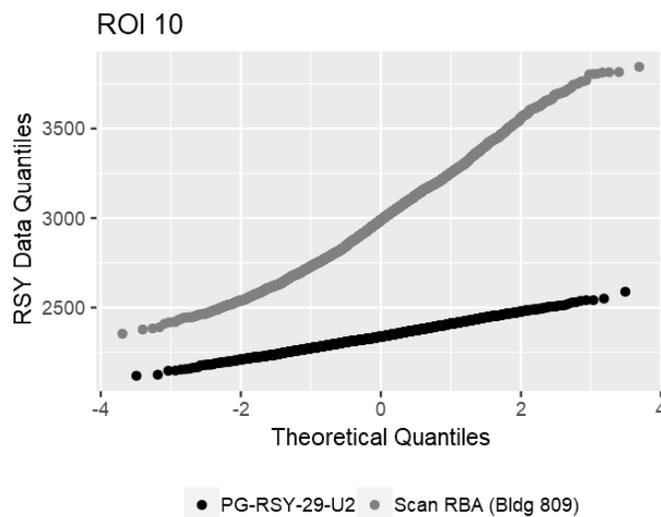
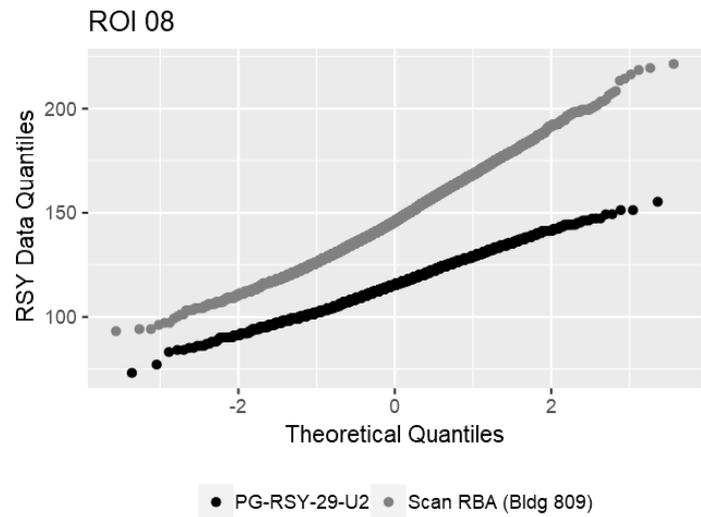
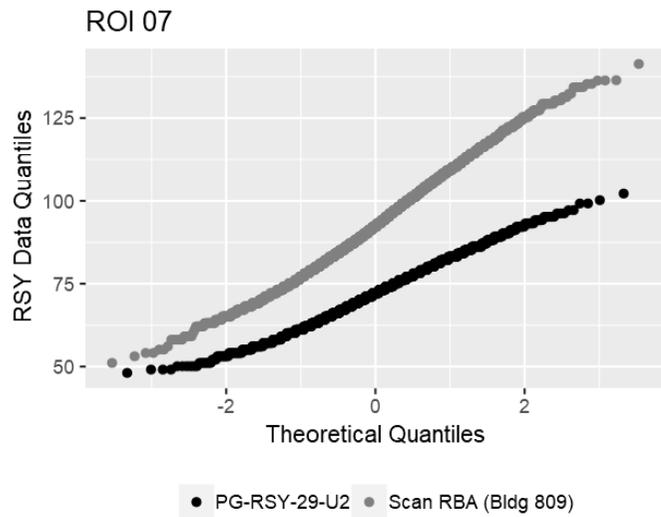
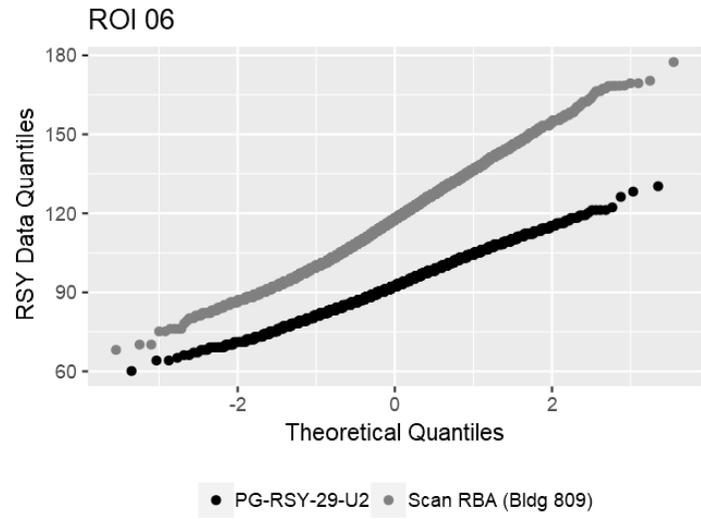
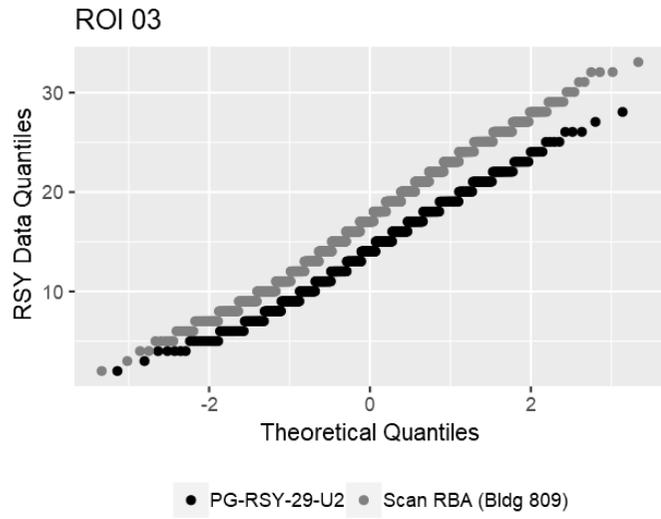
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-29-U2	2332
Scan RBA (Bldg 809)	4632

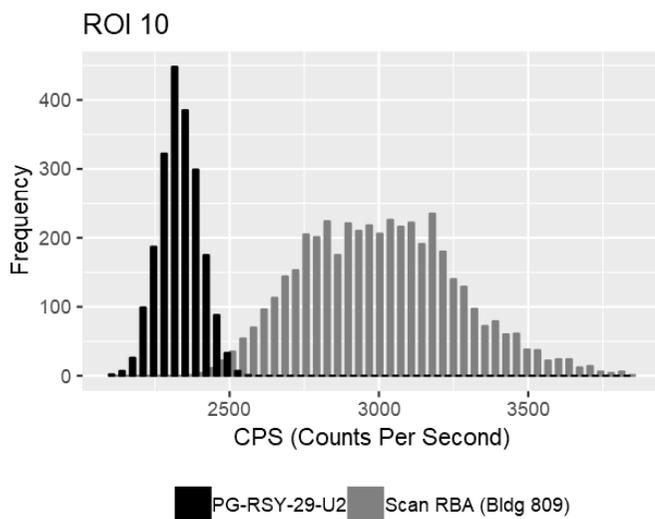
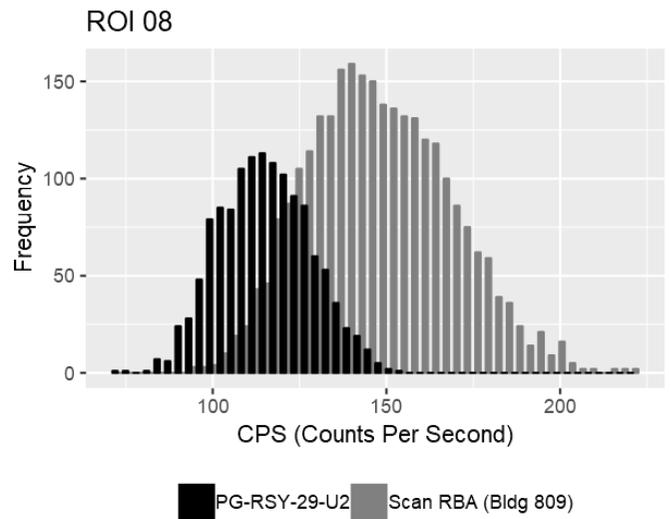
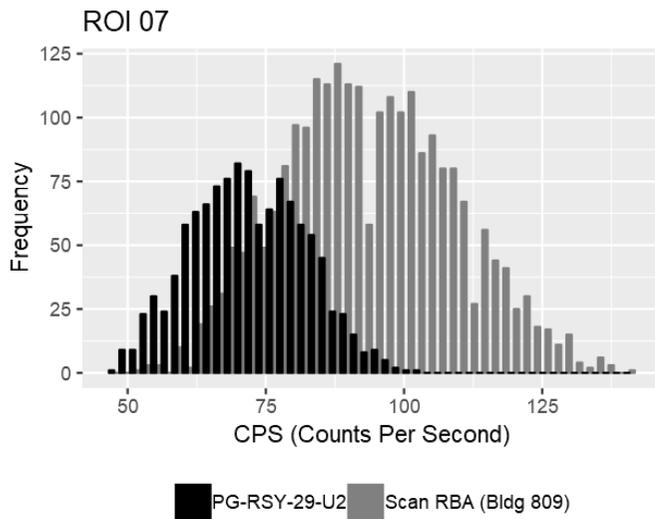
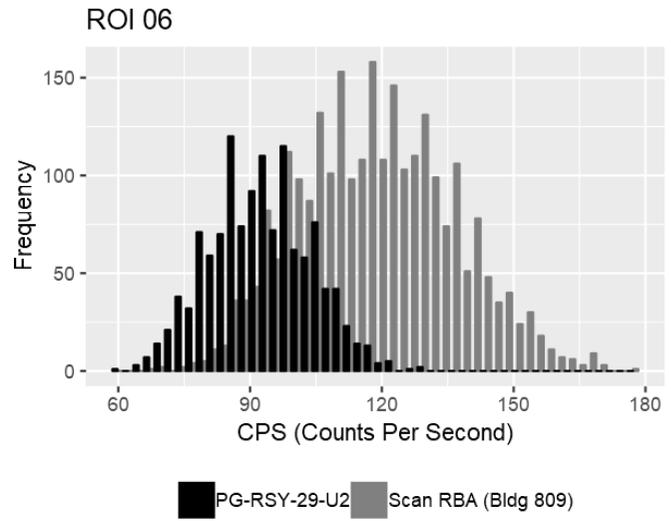
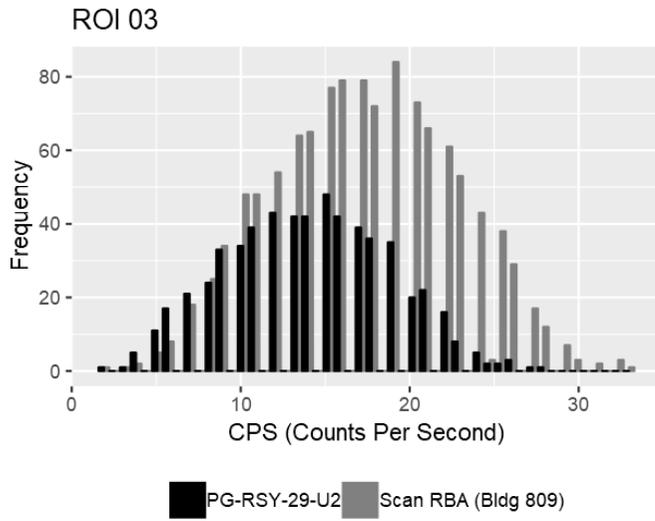
Soil Scan Statistics

Normal Q-Q Plots



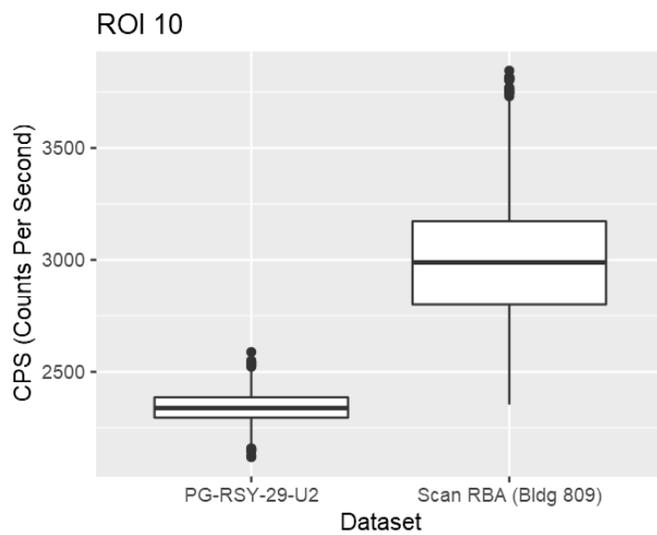
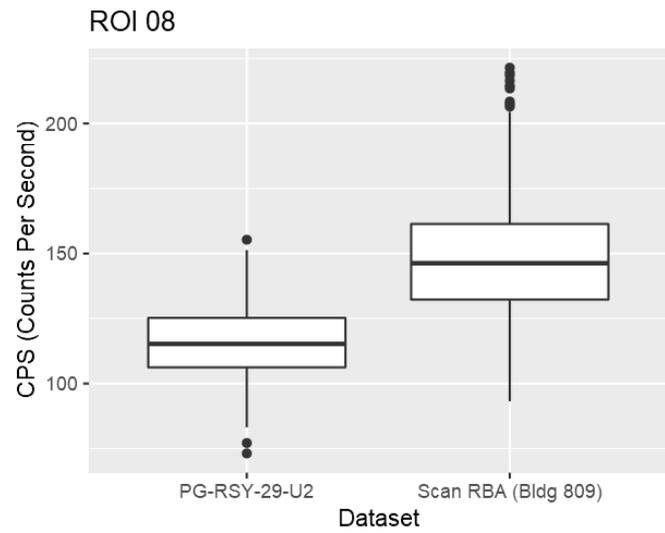
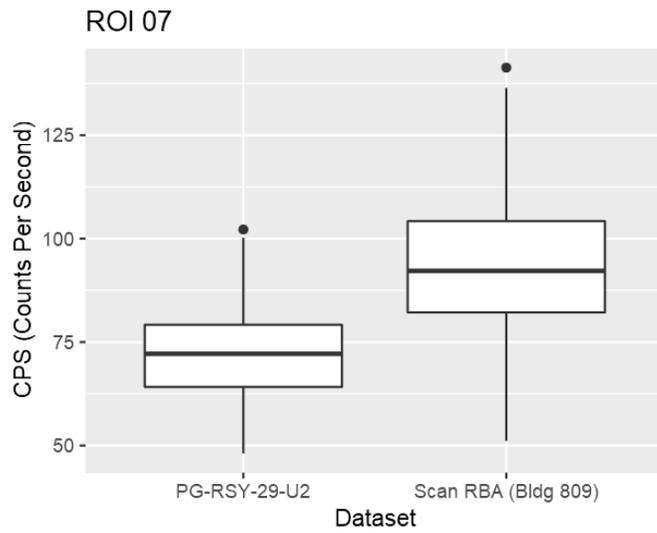
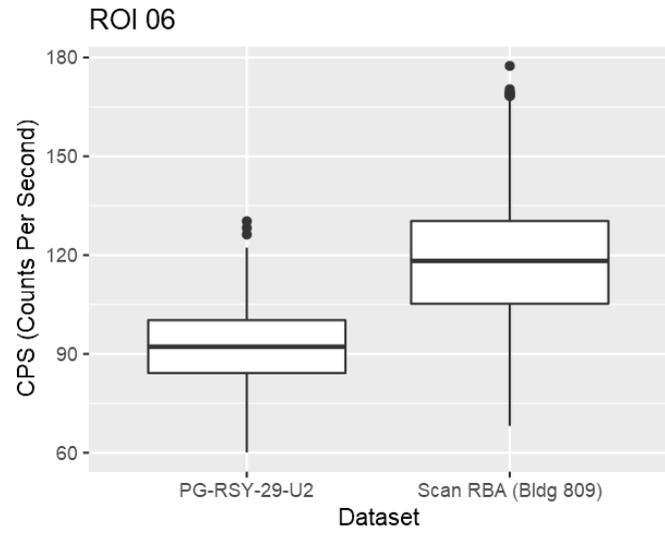
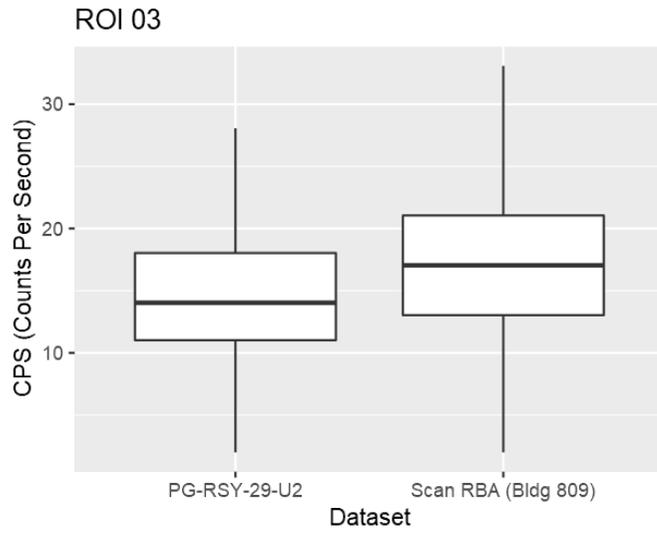
Soil Scan Statistics

Histograms



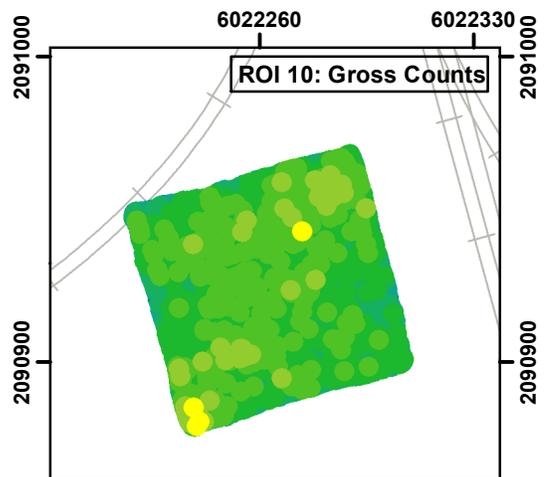
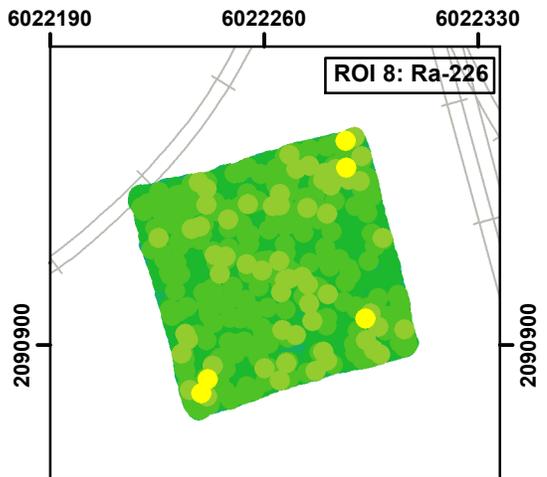
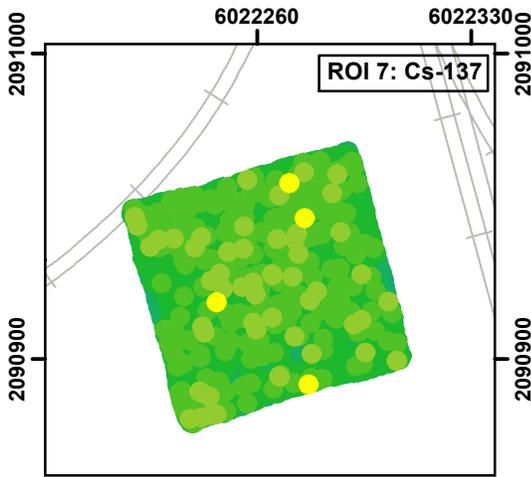
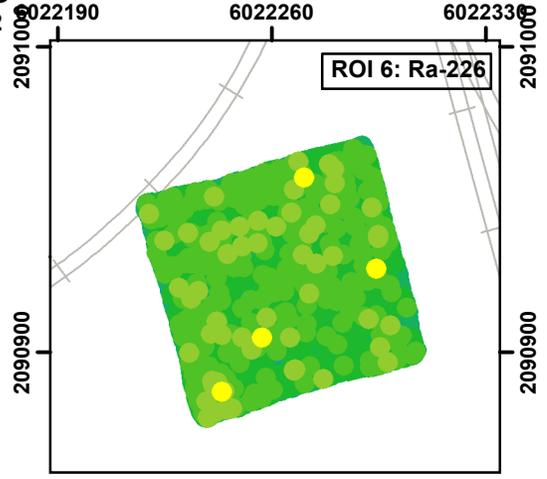
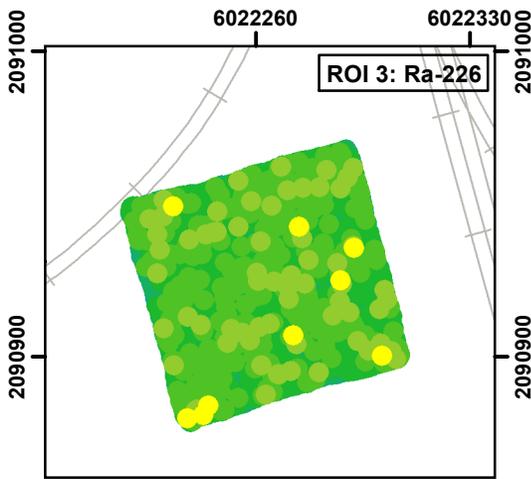
Soil Scan Statistics

Box Plots



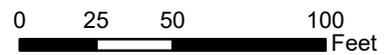
RSI Data Plots
HPNS Parcel G
RSY 29 Use 2

SU-28 B

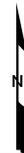


RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|--|--|
| ● > 3 std dev | ● > -1 to < 0 std dev |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev |

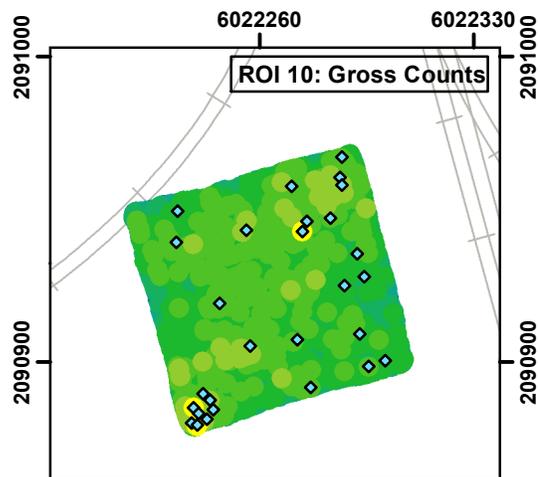
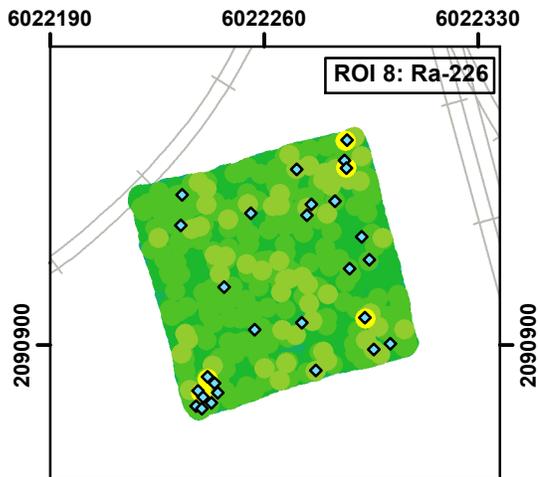
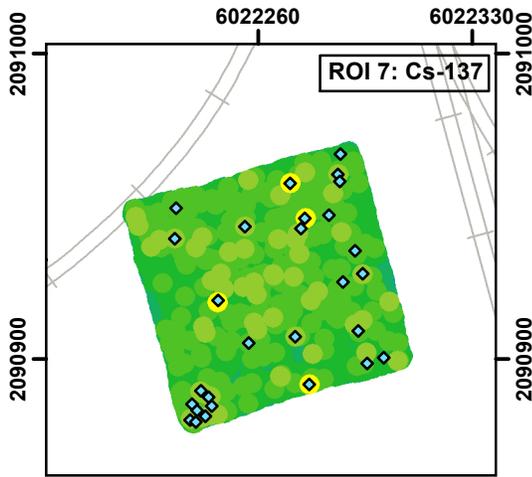
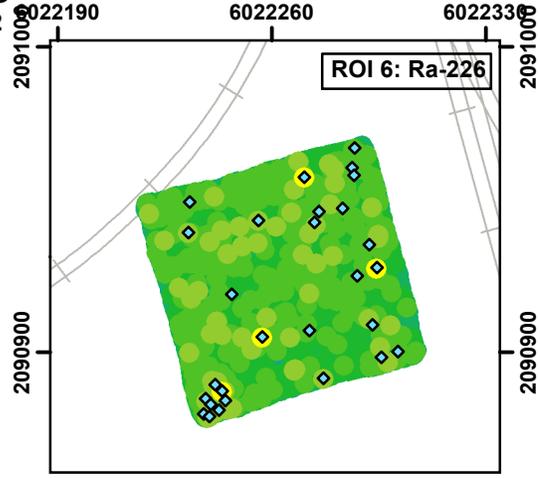
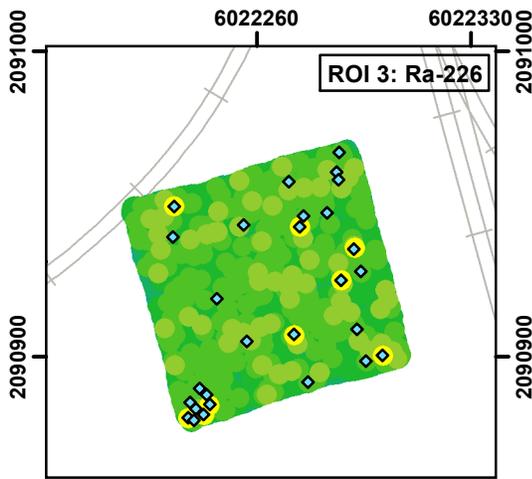


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 29 Use 2

SU-28 B



RS 700 Gamma Walkover Survey Data (VD1)

◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

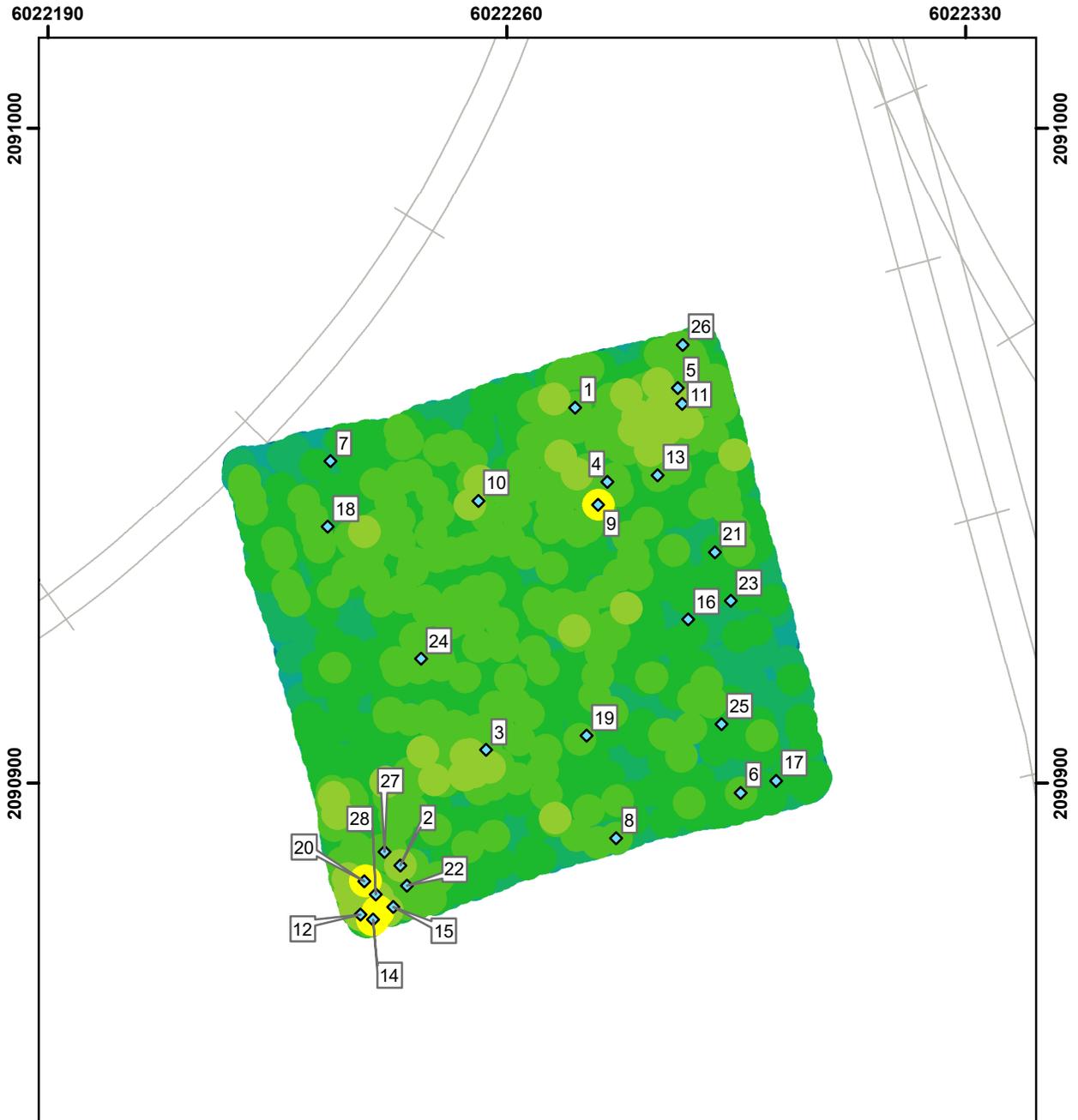


Coordinate system: CSP Zone III, NAD83, US Survey Foot



Follow-Up Static Survey
 HPNS Parcel G
 RSY 29 Use 2

SU-28 B



RSY 29 Use 2 (VD1, ROI 10 Gross Gamma)

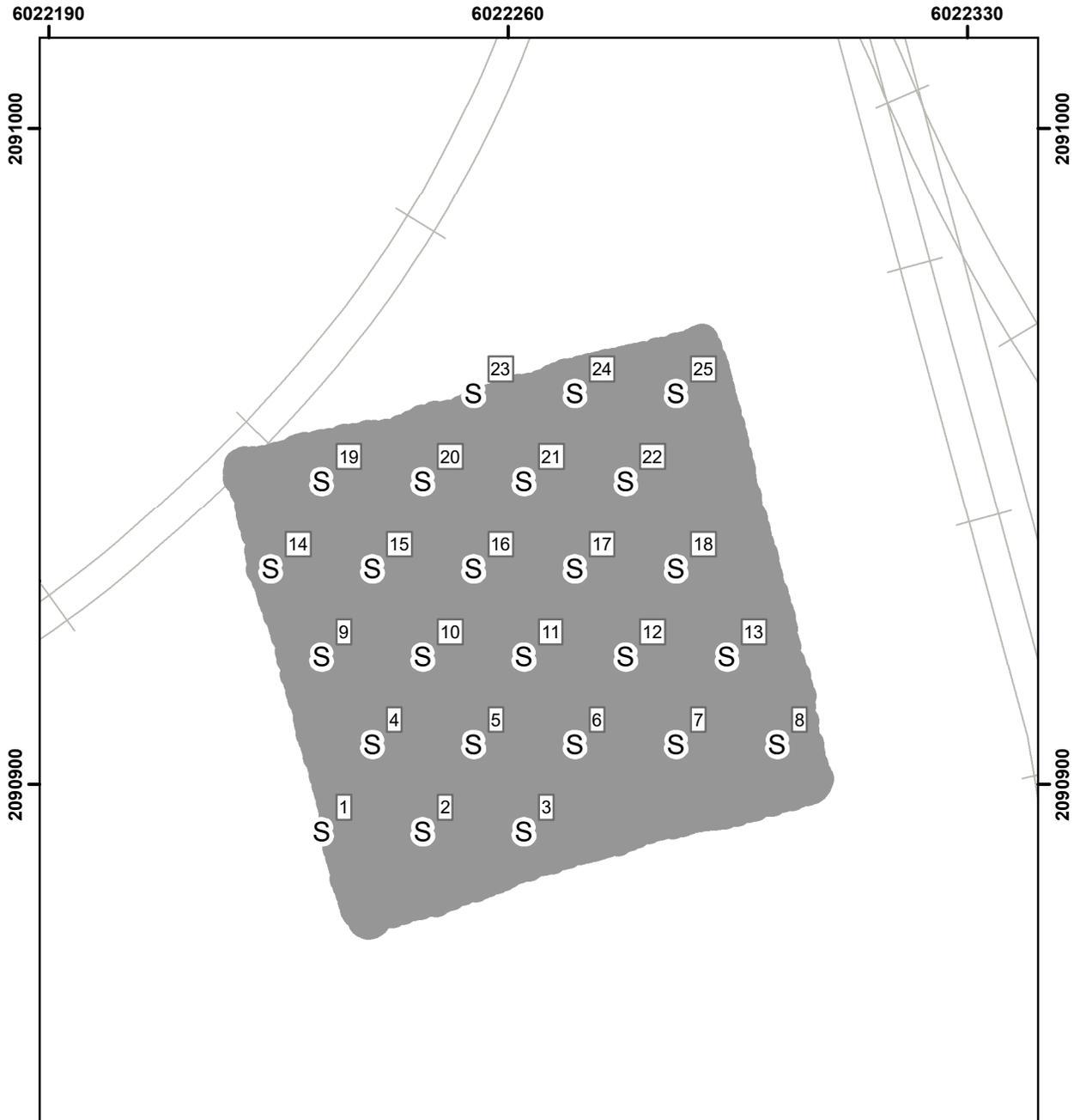
◆ Follow-Up Location	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

0 10 20 40
 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Systematic Sampling
HPNS Parcel G
RSY 29 Use 2

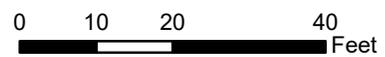
SU-28 B



RSY 29 Use 2

S Systematic Sample Location

● RS-700 GWS Coverage



Coordinate system: CSP Zone III, NAD83, US Survey Foot



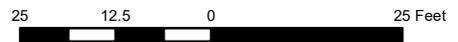
**Biased Sampling
HPNS Parcel G
RSY 29 Use 2**

SU-28 B



RSY 29 Use 2

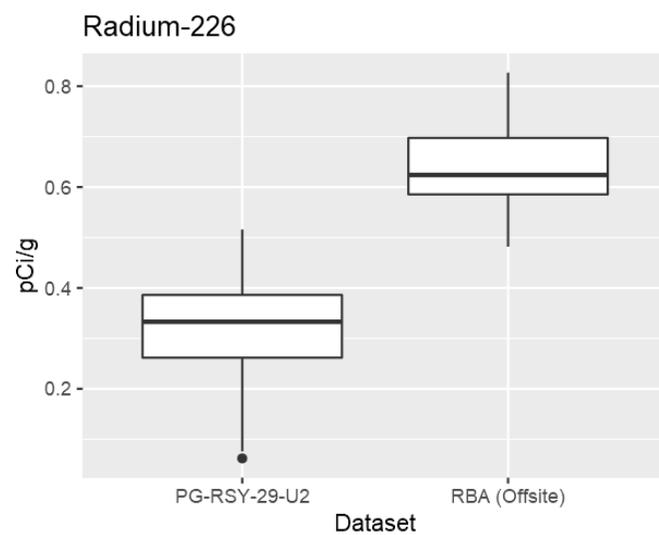
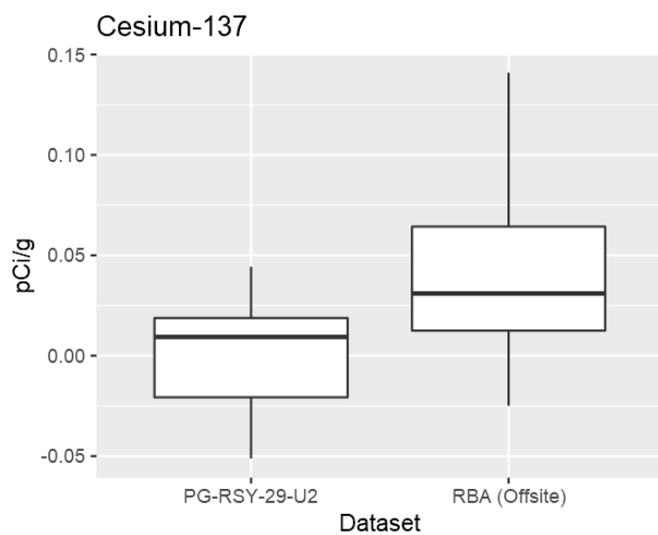
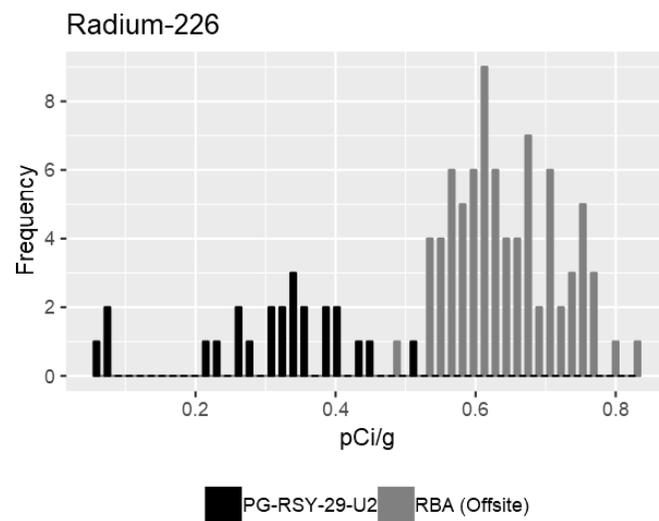
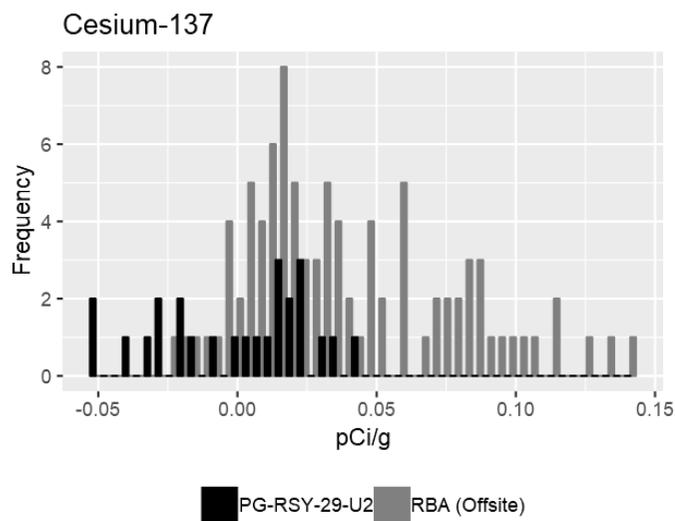
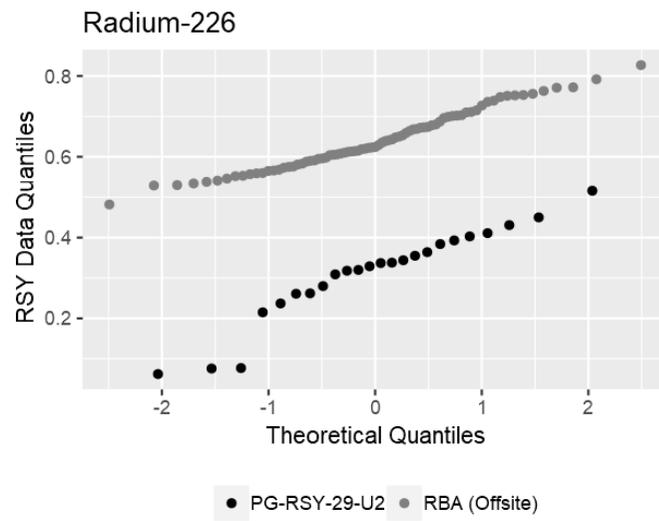
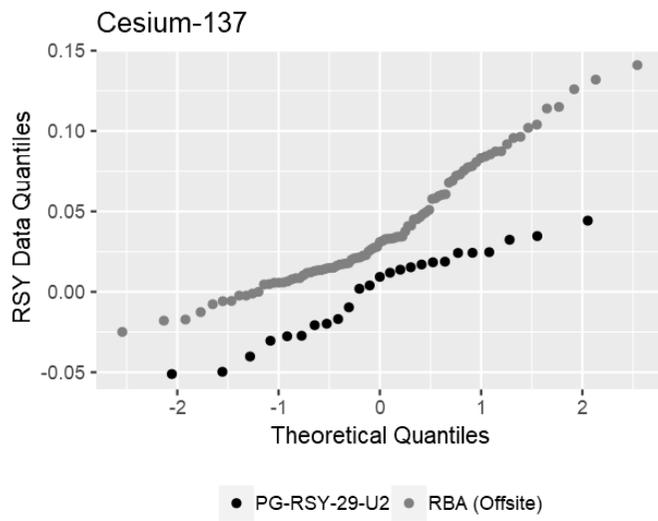
- B** Biased Sample Location
-  RS-700 GWS Coverage



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Rs-226**
 LBGR: **0.329** pCi/g

Location: **RSY 29 Use 2**

DOGL: **1**
 LBGR = **Median SU Data**
 LBGR = **0.329**

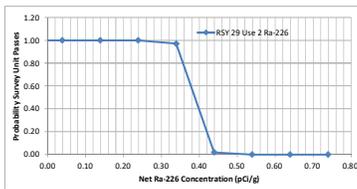
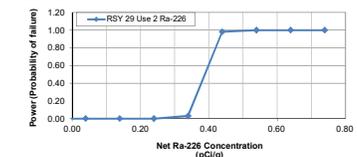
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0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	59	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7.5	S
0.71	R	0.711	109	0	7.5	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	26	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.556	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	50.5	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	47	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	55	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.77	R	0.771	122	0	41.5	R
0.72	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.589	50.5	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	29	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.56	S	0.187	25	25	101	R
0.48	S	0.074	21	21	102.5	R
0.79	S	-0.251	2	2	102.5	R
0.27	S	-0.092	5	5	104	R
0.27	S	0.008	14	14	105	R
0.38	S	-0.02	10	10	106	R
0.41	S	0.102	23	23	107	R
0.38	S	0.009	15	15	108	R
0.35	S	0.035	18	18	109	R
0.25	S	-0.067	7.5	7.5	110.5	R
0.31	S	-0.068	6	6	110.5	R
0.38	S	-0.049	9	9	112	R
0.41	S	0.082	22	22	113	R
0.62	S	-0.2668	1	1	114	R
0.35	S	0.064	20	20	115	R
0.28	S	0.026	17	17	116.5	R
0.29	S	-0.011	11	11	116.5	R
0.21	S	-0.114	4	4	118	R
0.36	S	0.055	19	19	119	R
0.28	S	-0.067	7.5	7.5	120	R
0.07	S	-0.252	3	3	121	R
0.35	S	0	13	13	122	R
0.32	S	-0.009	12	12	123	R
0.34	S	0.015	16	16	124	R
0.45	S	0.121	24	24	125	R
Sum =			7875	325		

Statistic	Value	Sample Size
Count	25	m
SD	0.113	
Median	0.329	
Ref Stats		n
Count	100	n
SD	0.073	
Critical Value	1951.9	

Parameter	Value
Number of Samples	25
LBGR	0.329
A/O	5.92
N	25.23
N/Z	13
Actual N	25
SU σ	0.113
Z(1-alpha)	2.326
Z(1-beta)	1.645

POWER CURVE CALCULATION

Concentration (C)	(C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.55	-0.31	-5.6	0.00001	0.00000	0.025	0.024989	0.158016	10292.2	0.00	1.00
0.6	-0.26	-5.2	0.00020	0.00001	0.51	3.572099	1.89	869.236	0.00	1.00
0.7	-0.16	-4.3	0.00234	0.00017	5.8475	57.65651	7.593189	213.416	0.00	1.00
0.8	-0.06	-3.4	0.00666	0.00074	16.66	229.8282	15.16009	106.18	0.00	1.00
0.9	0.04	-2.6	0.03855	0.00847	66.375	2238.671	47.31459	32.3363	0.00	1.00
1	0.14	-1.7	0.11467	0.03935	286.665	8310.205	91.16032	14.696	0.00	1.00
1.1	0.24	-0.8	0.28580	0.14608	714.51	20311.17	142.5173	6.39814	0.00	1.00
1.2	0.34	0.1	0.52819	0.36198	1320.47	26144.76	161.6934	1.89179	0.03	0.97
1.3	0.44	1.0	0.76025	0.53370	1900.63	17590.17	132.6279	-2.058	0.98	0.02
1.4	0.54	1.9	0.91045	0.84861	2276.11	6280.02	79.12029	-8.2123	1.00	0.00
1.5	0.64	2.7	0.97188	0.94921	2429.7	1489.832	38.72767	-20.744	1.00	0.00
1.6	0.74	3.6	0.99334	0.98741	2483.34	229.6262	15.16009	-56.529	1.00	0.00



QUANTILE TEST

From NUREG 1505, Table A.7b Values of r and k for the Quantile Test When α is Approximately 0.025

25 n (number of survey unit measurements)
 100 m (number of reference area measurements)

Use:	m = 100
	n = 25
	r = 4
	k = 3
	α = 0.025

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile Test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

# of R:	100	n
# of S:	25	m
Avg Rank R:	75.5	
Avg Rank S:	13	

For m or n greater than 20, the critical value (k) can be calculated from

$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

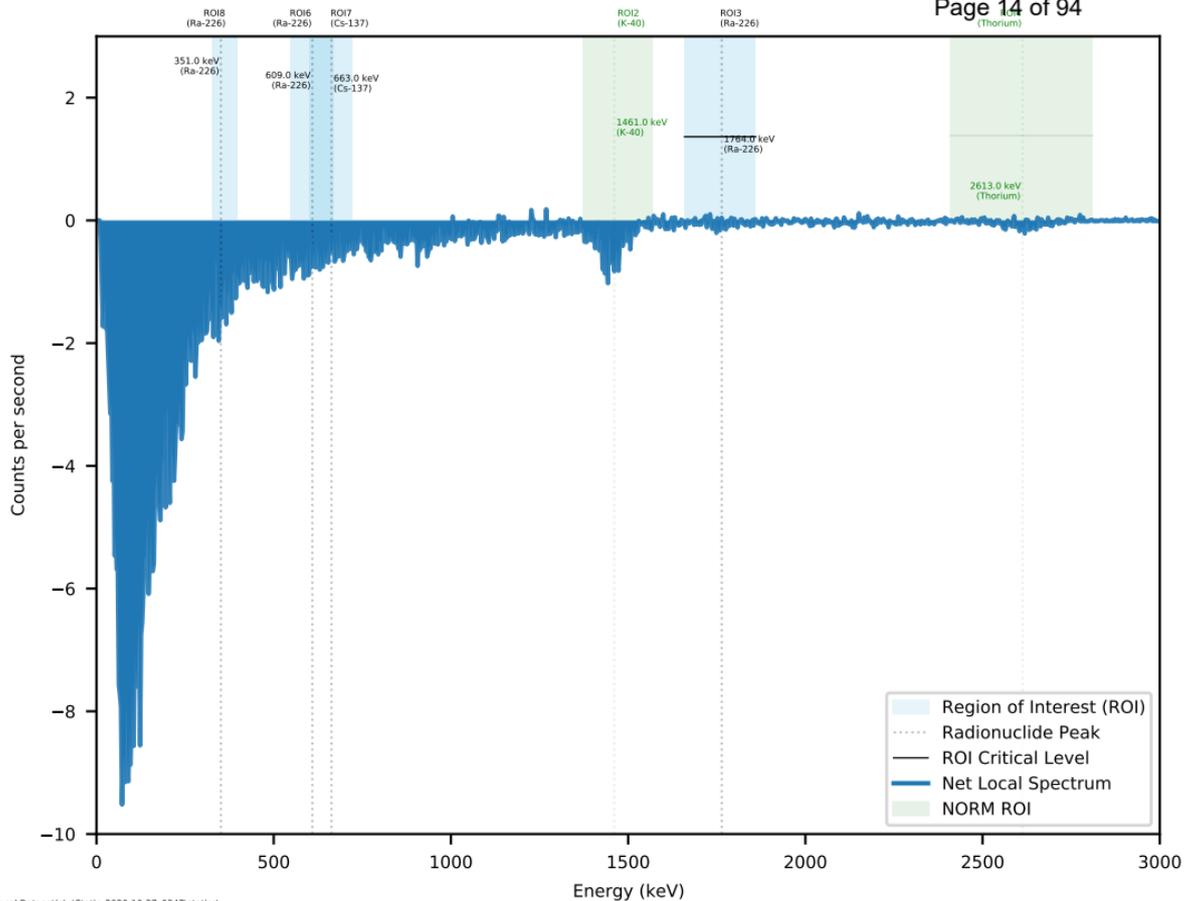
z = 99.0% percentile of standard normal distribution = 2

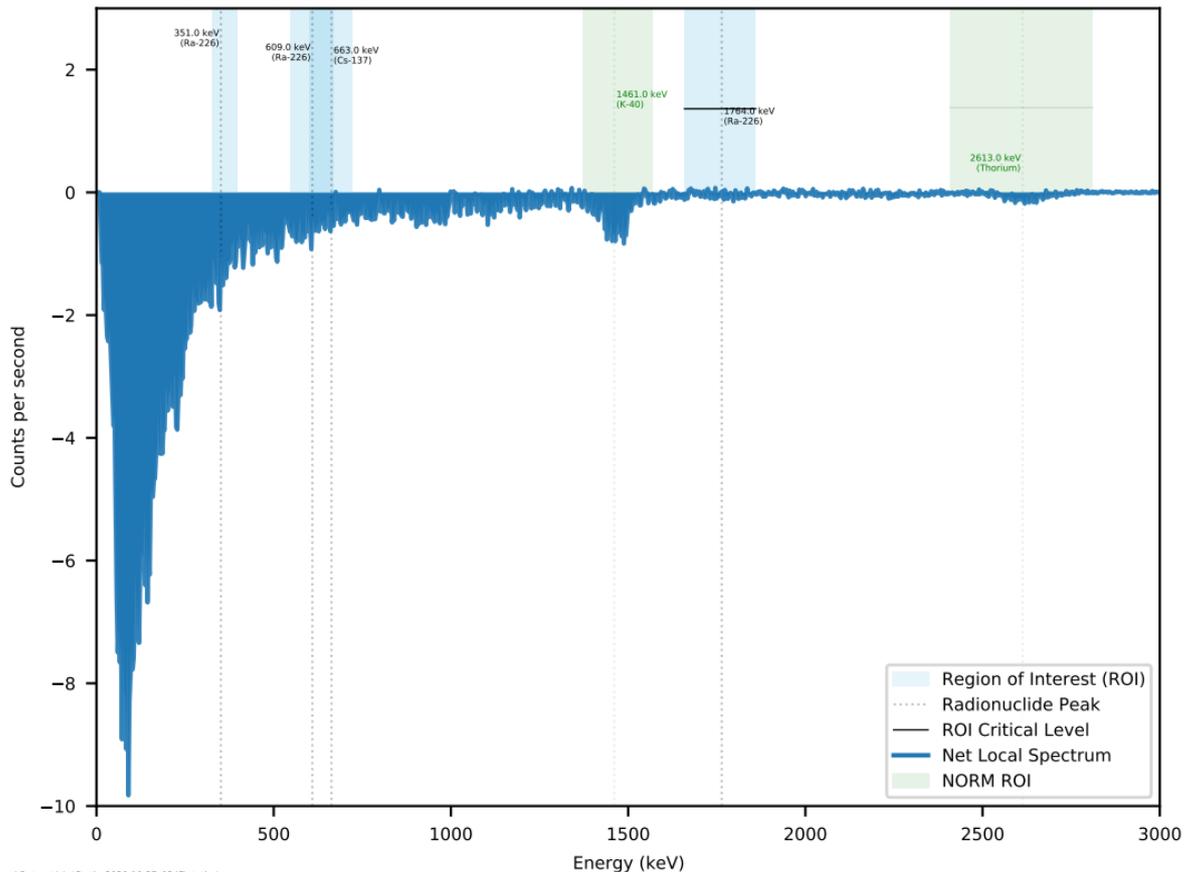
$$k = 1951.9$$

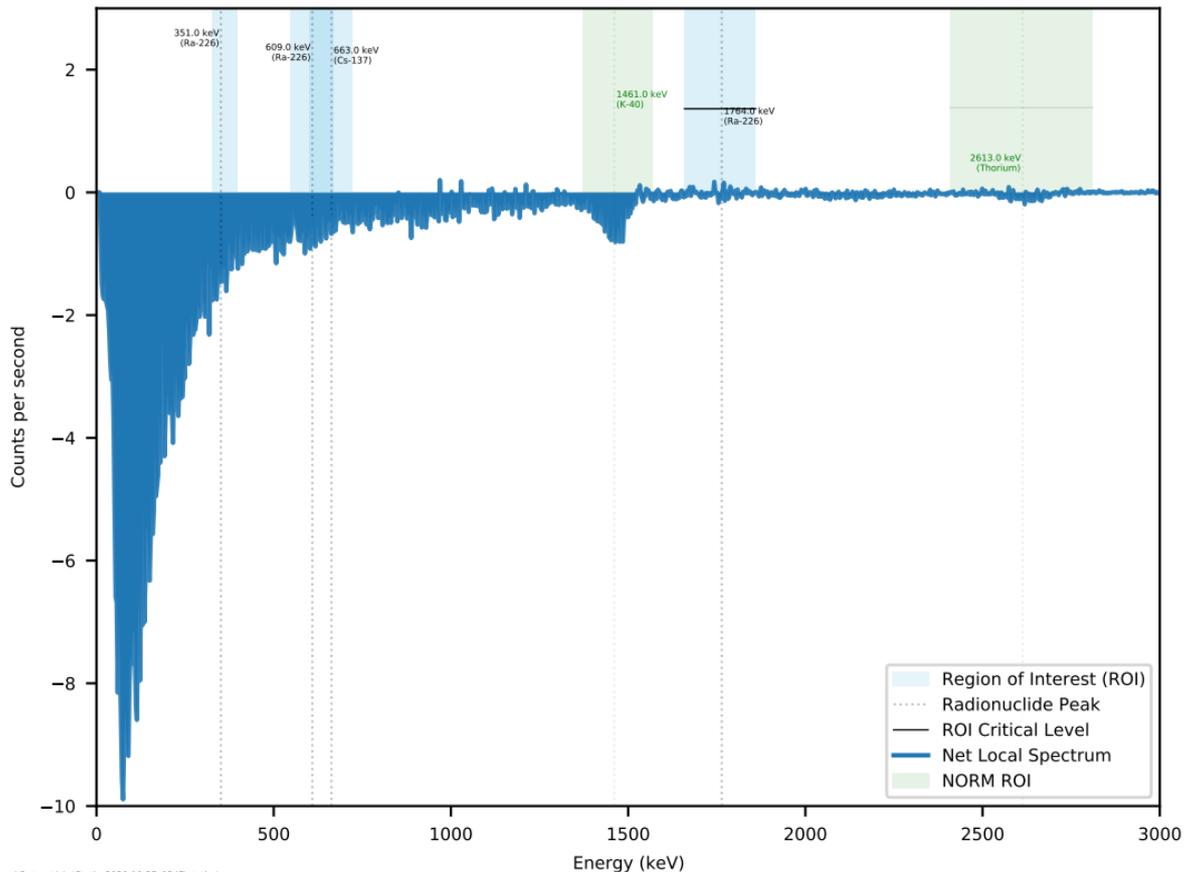
$$\alpha = \alpha/2 = 0.01$$

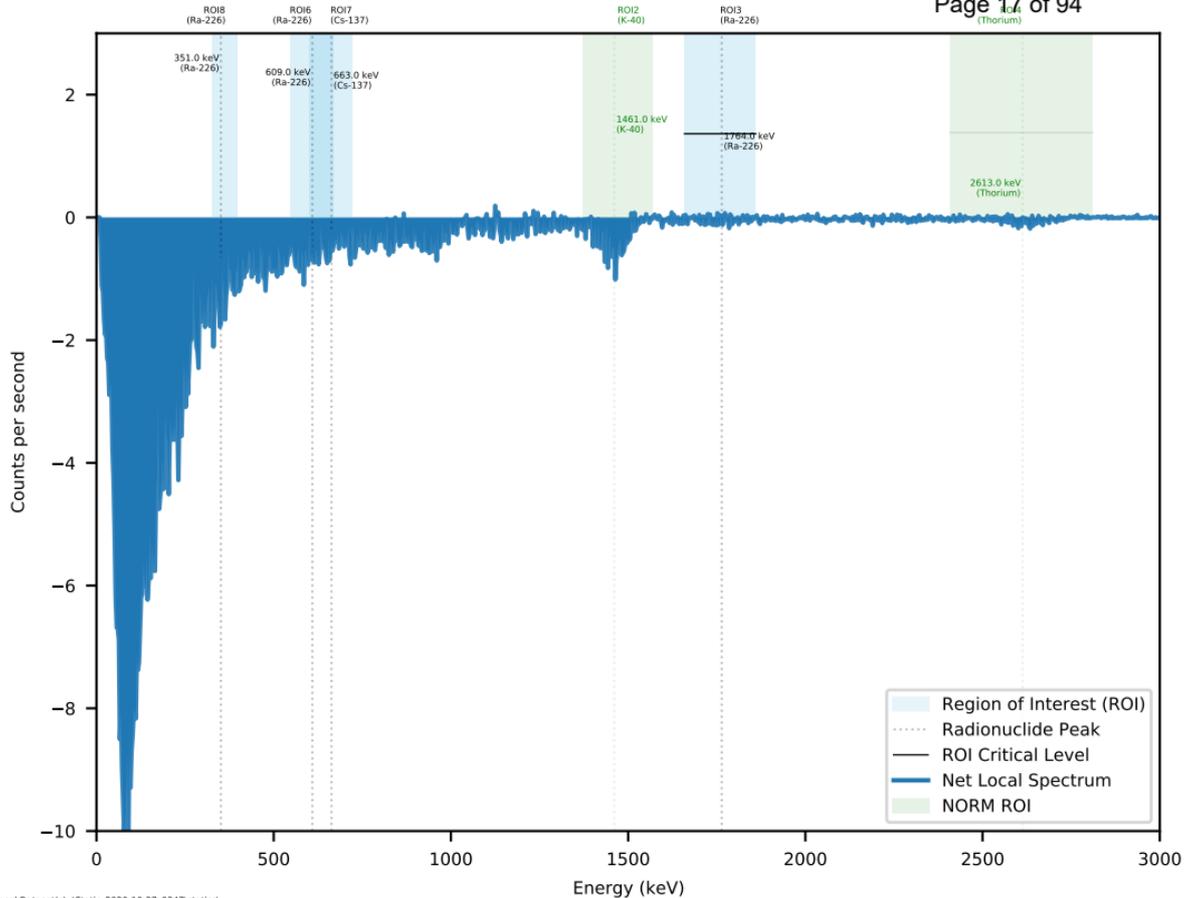
$$\beta = 0.05$$

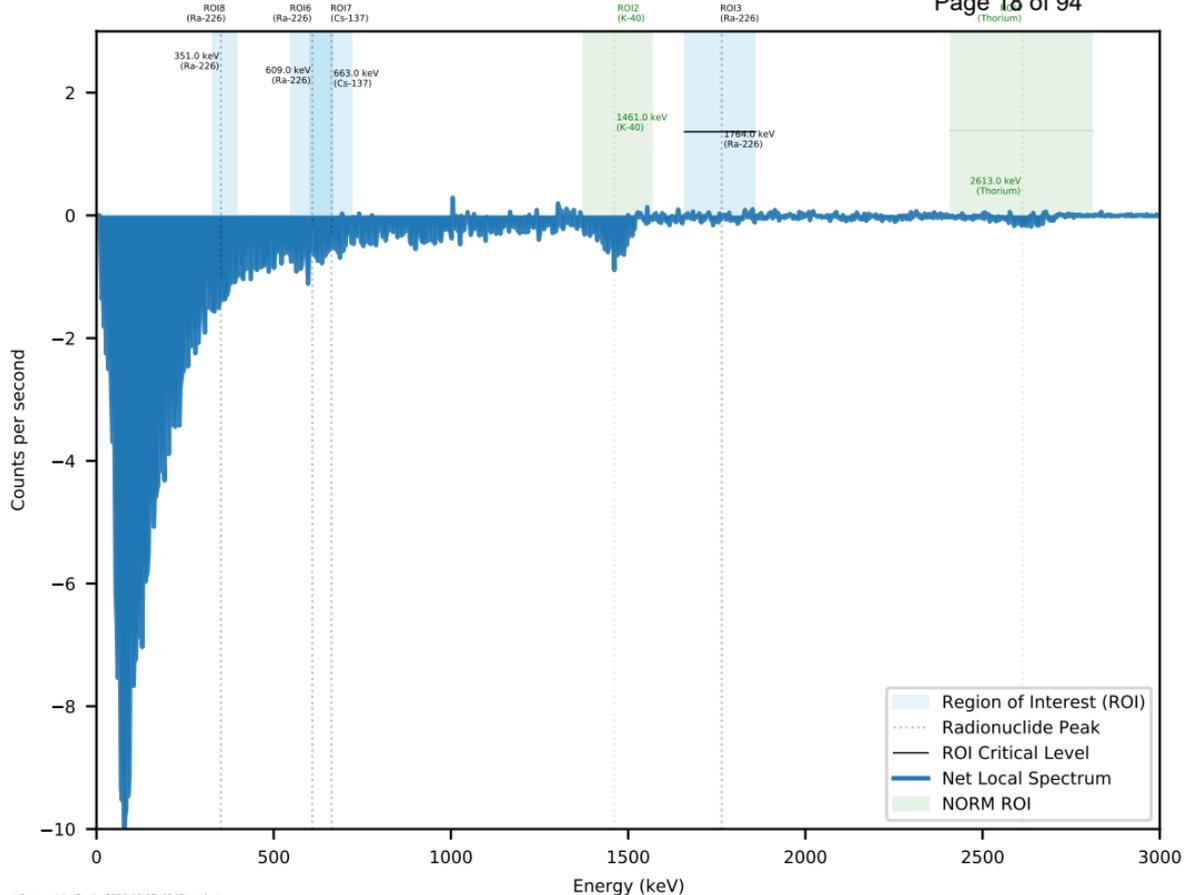
Since the sum of the survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

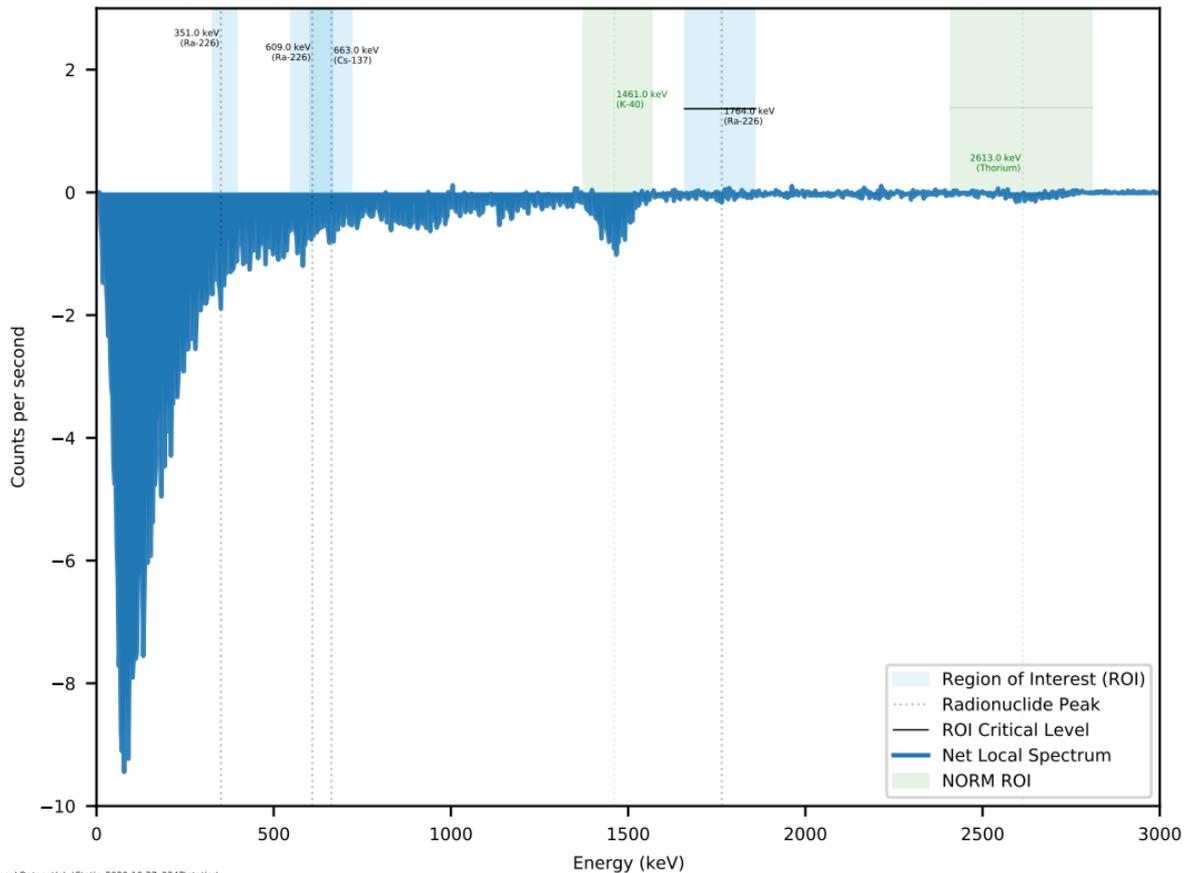


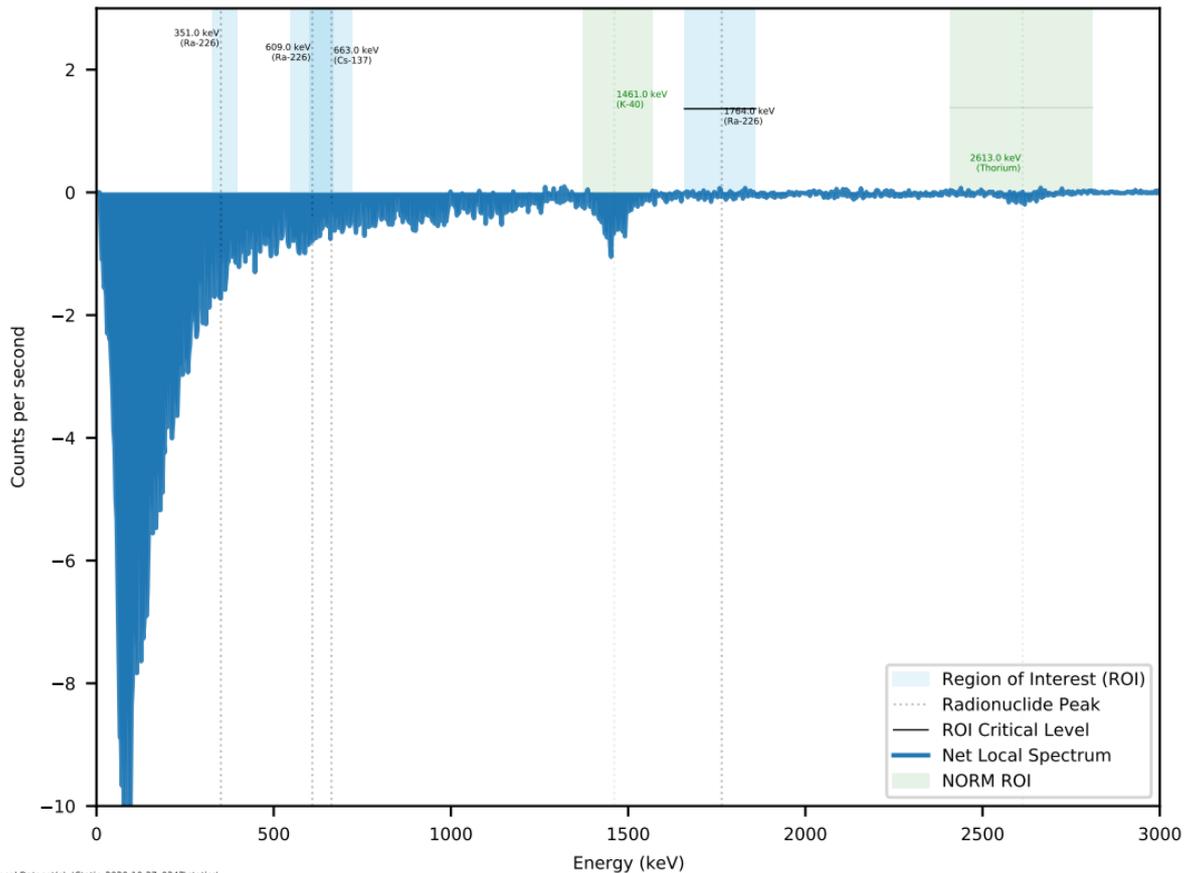


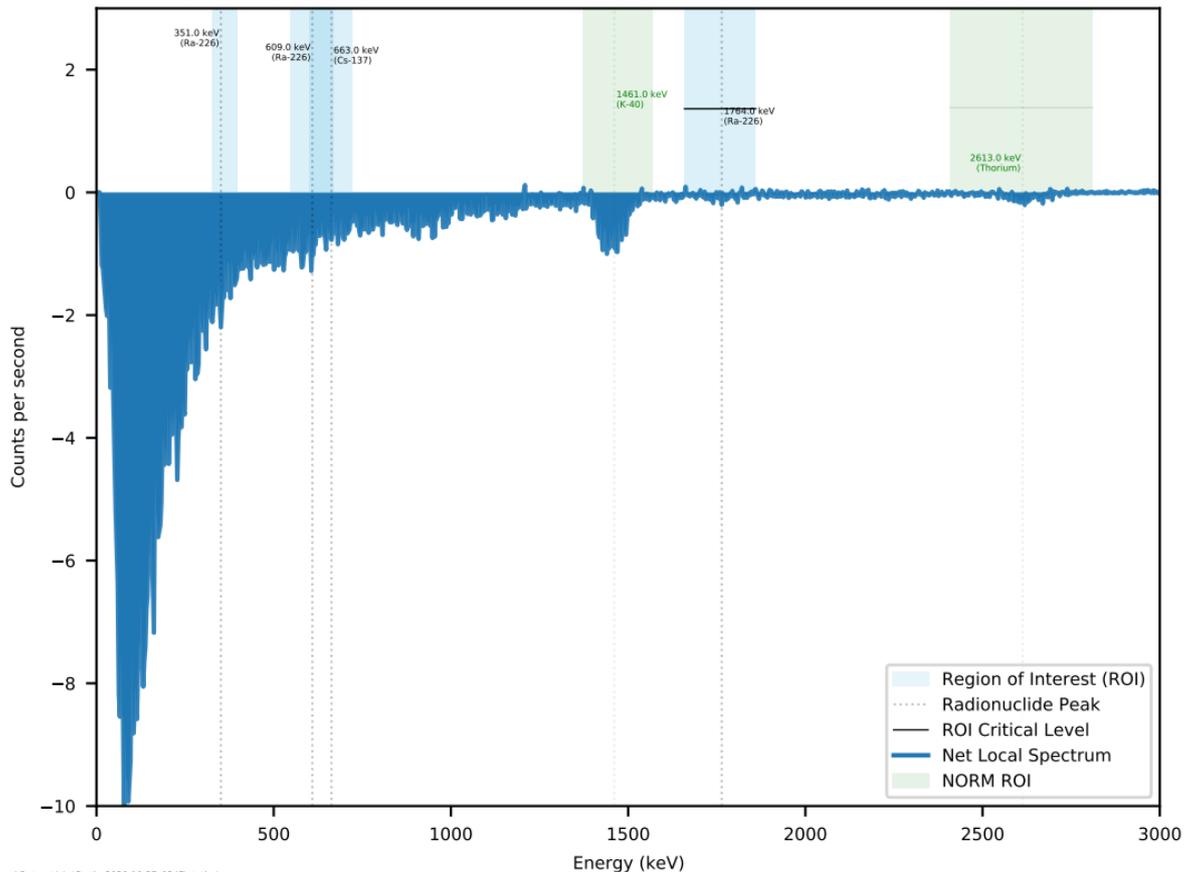


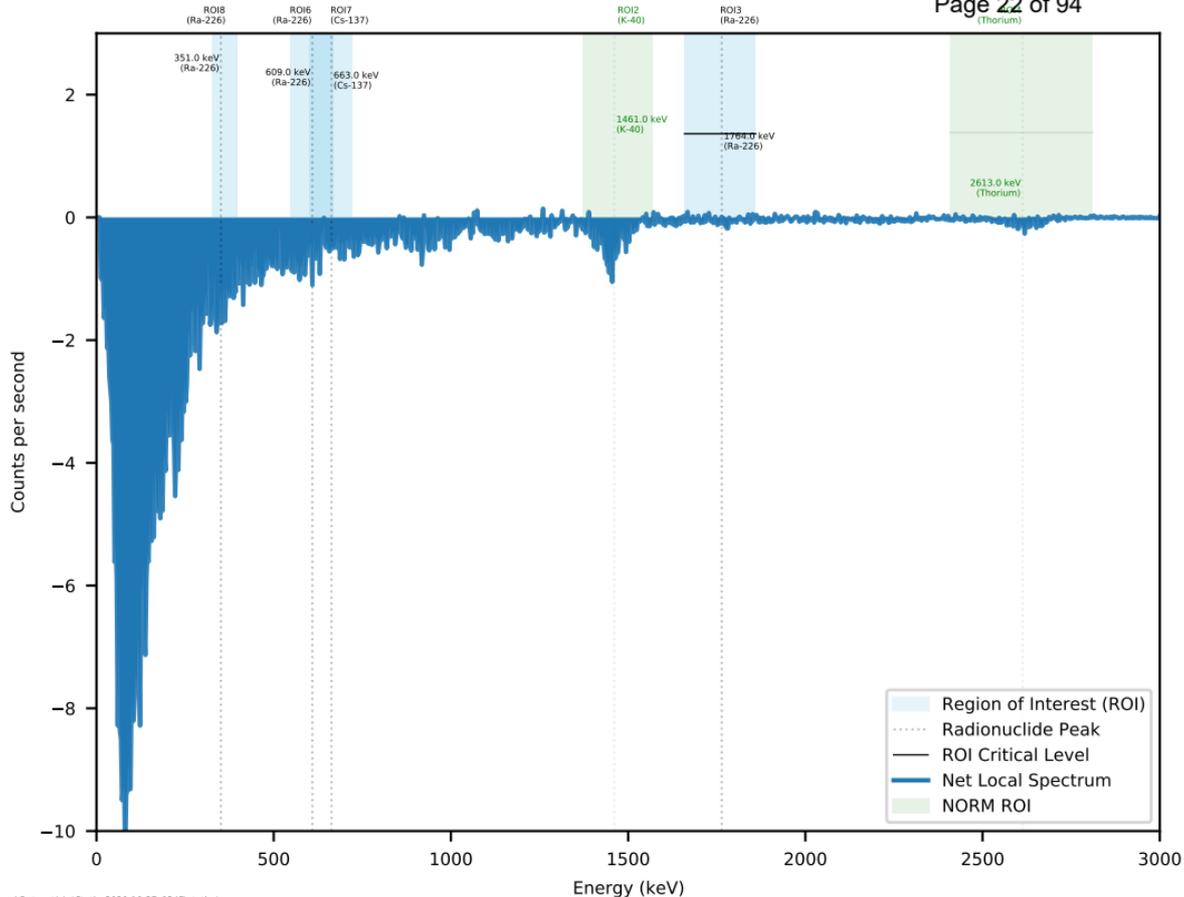


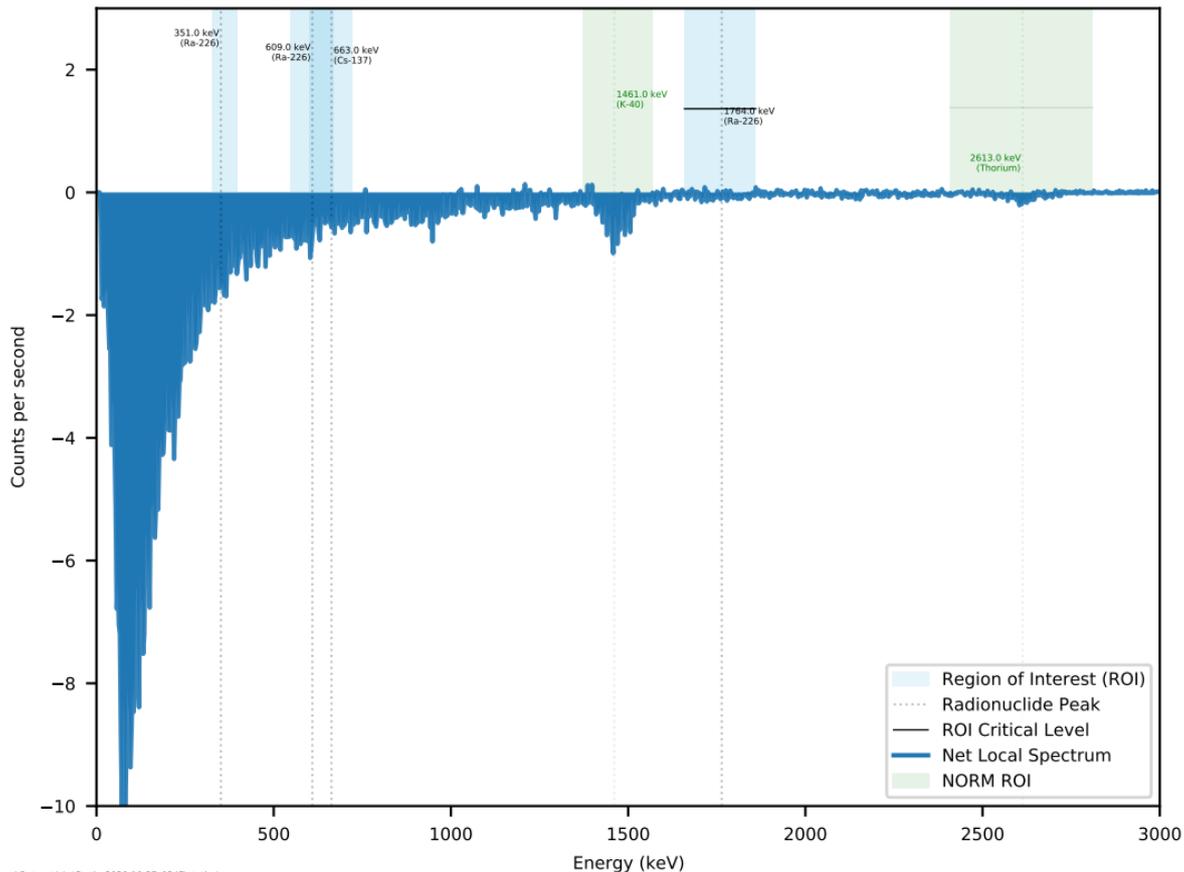


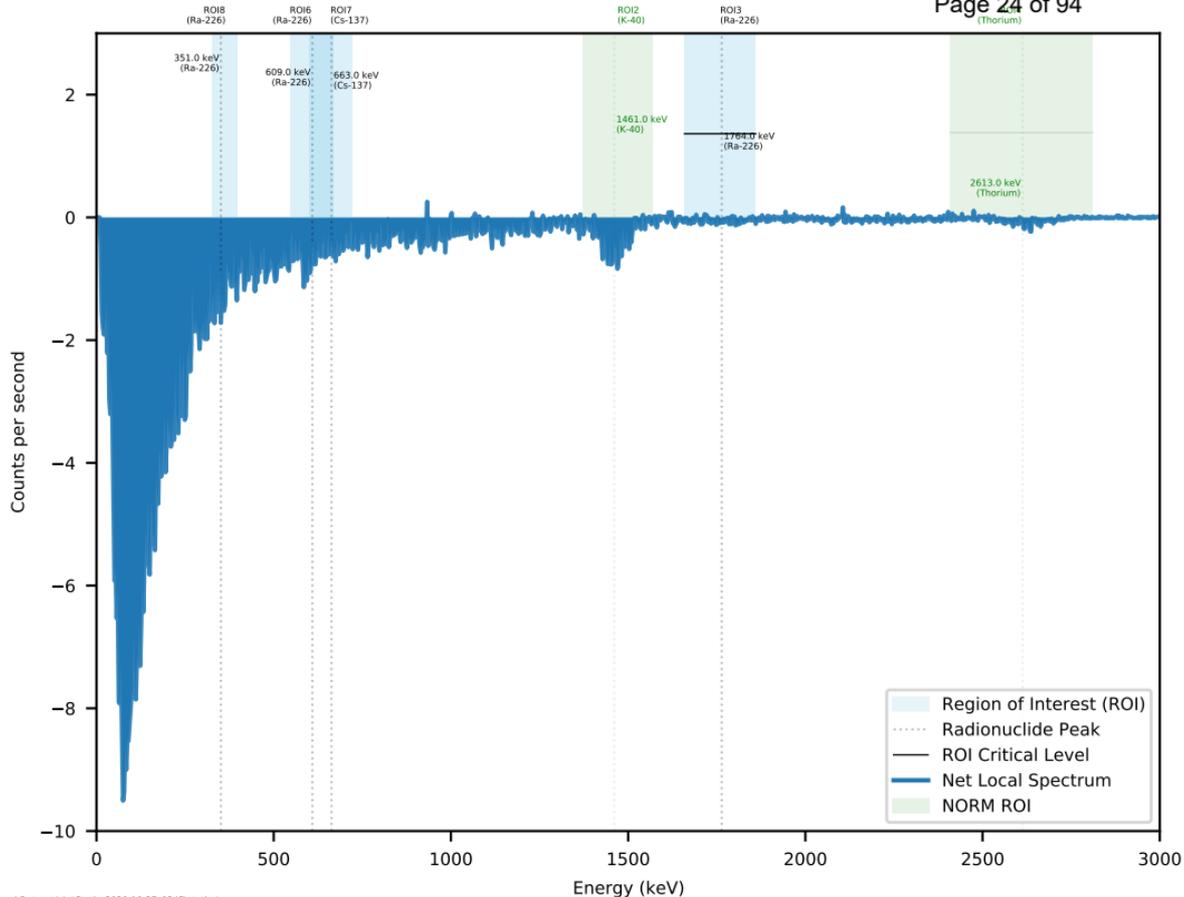


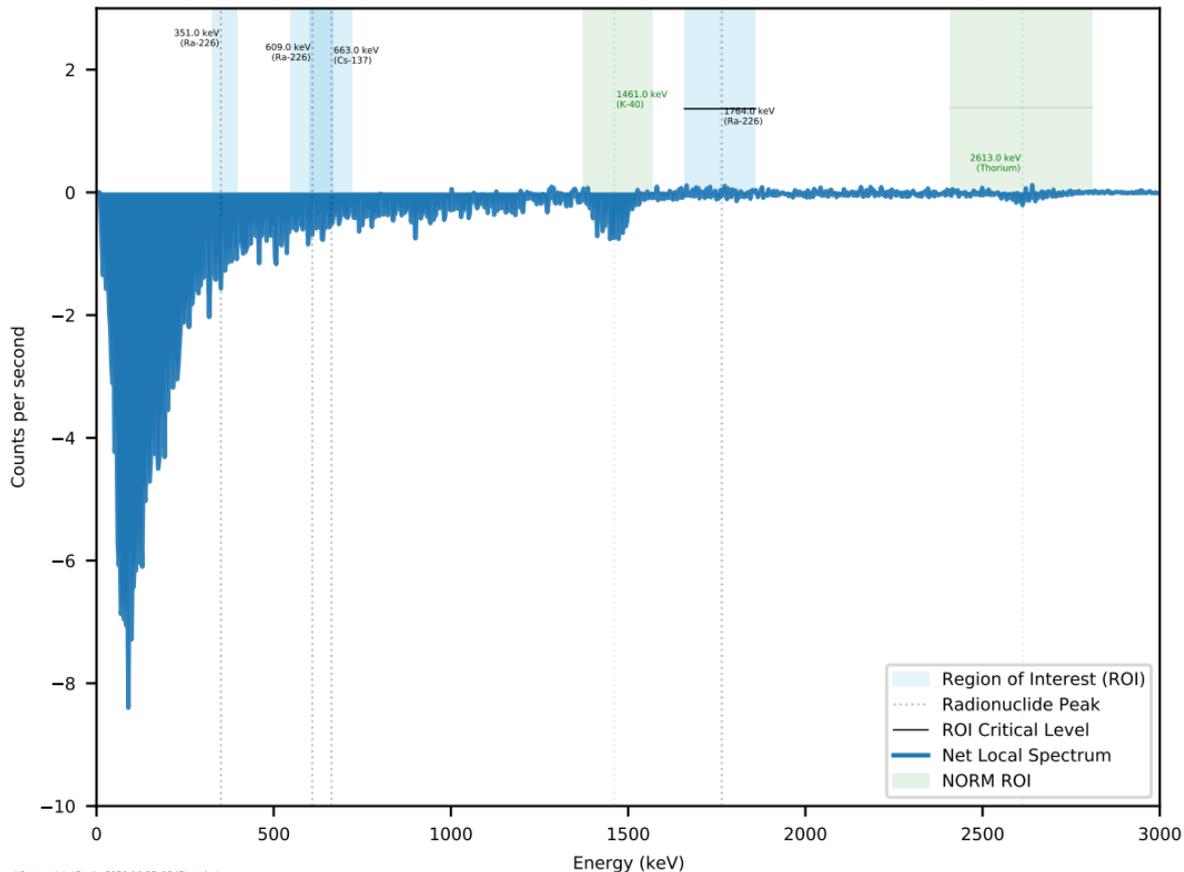


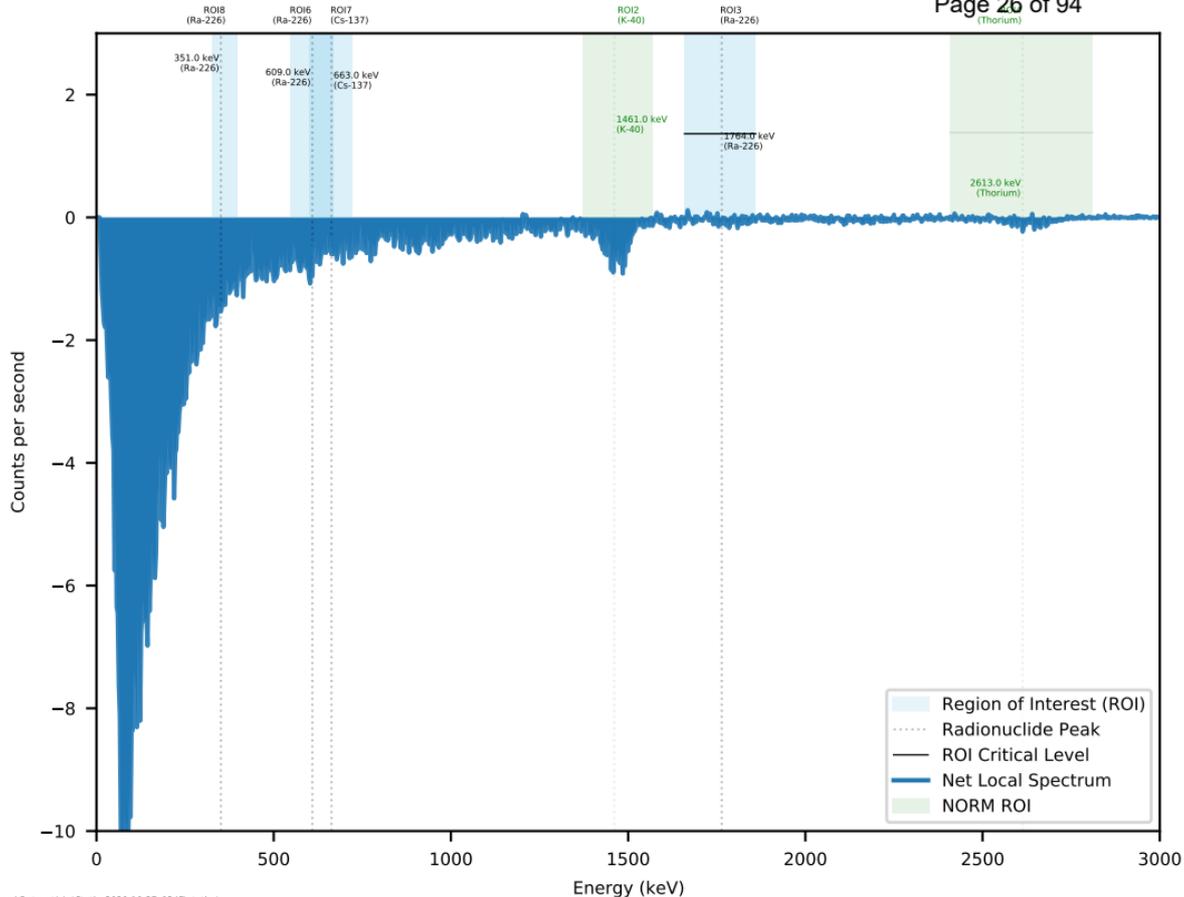


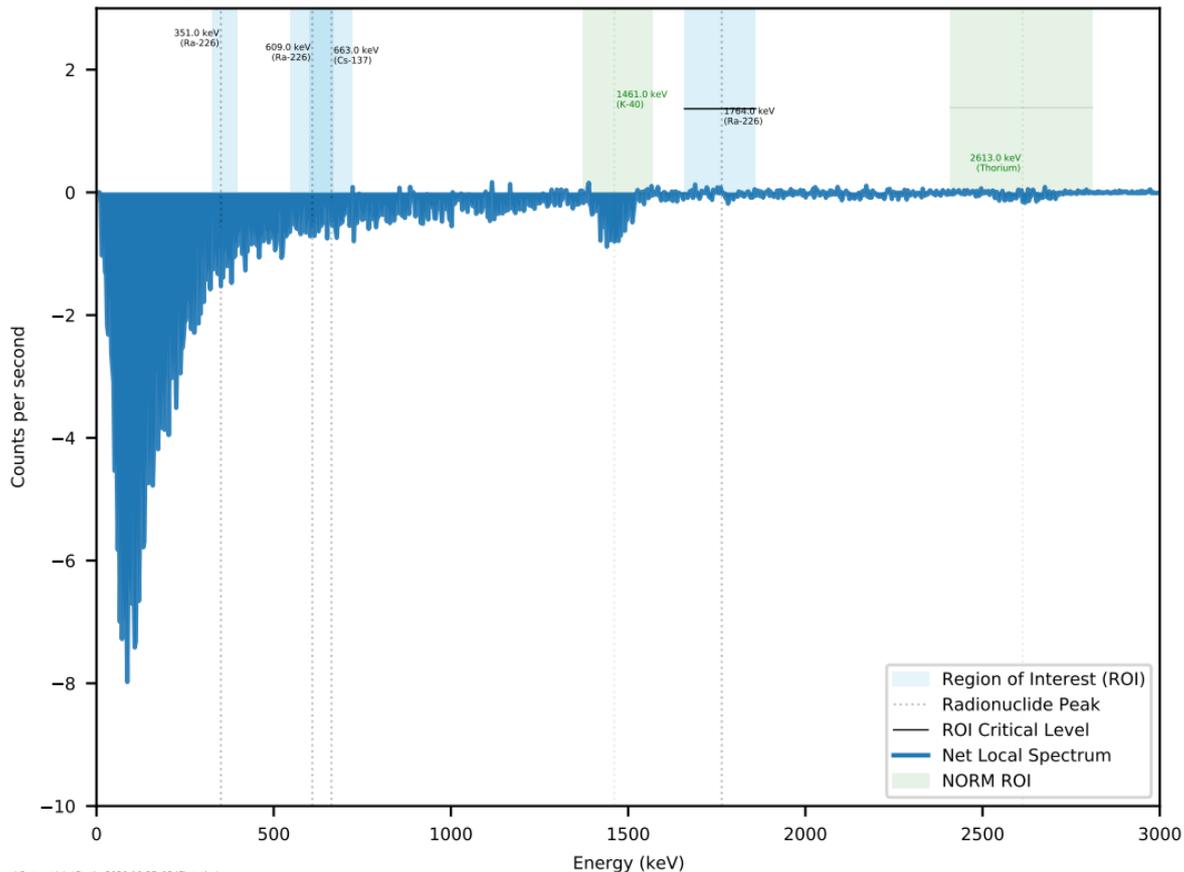


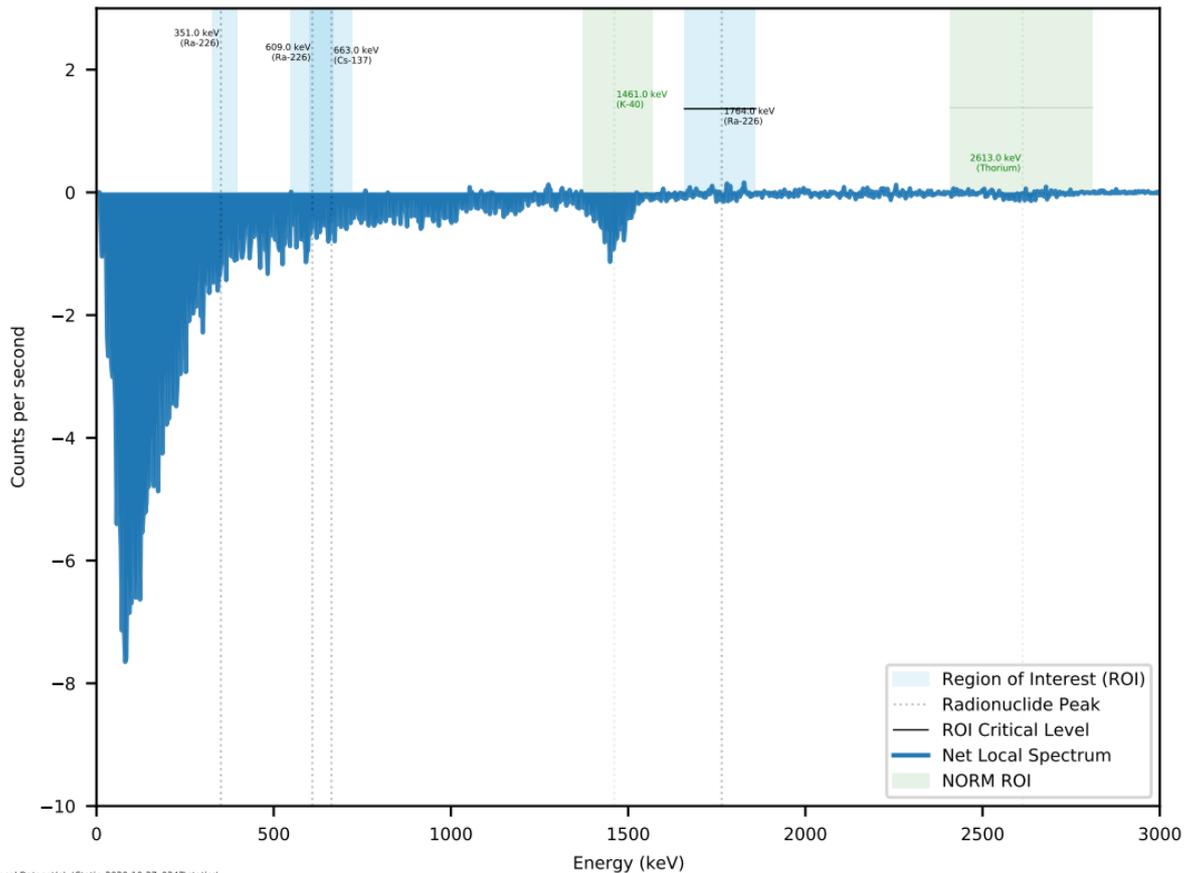


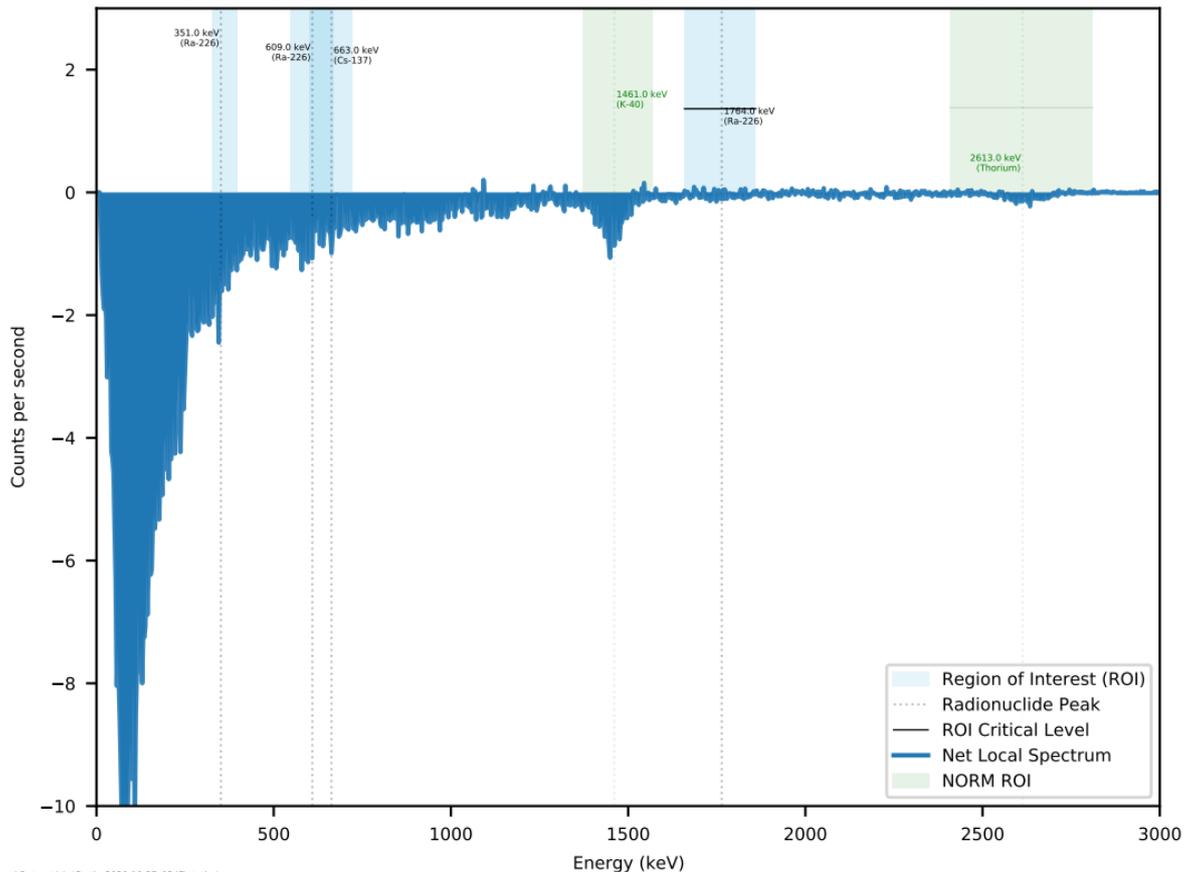


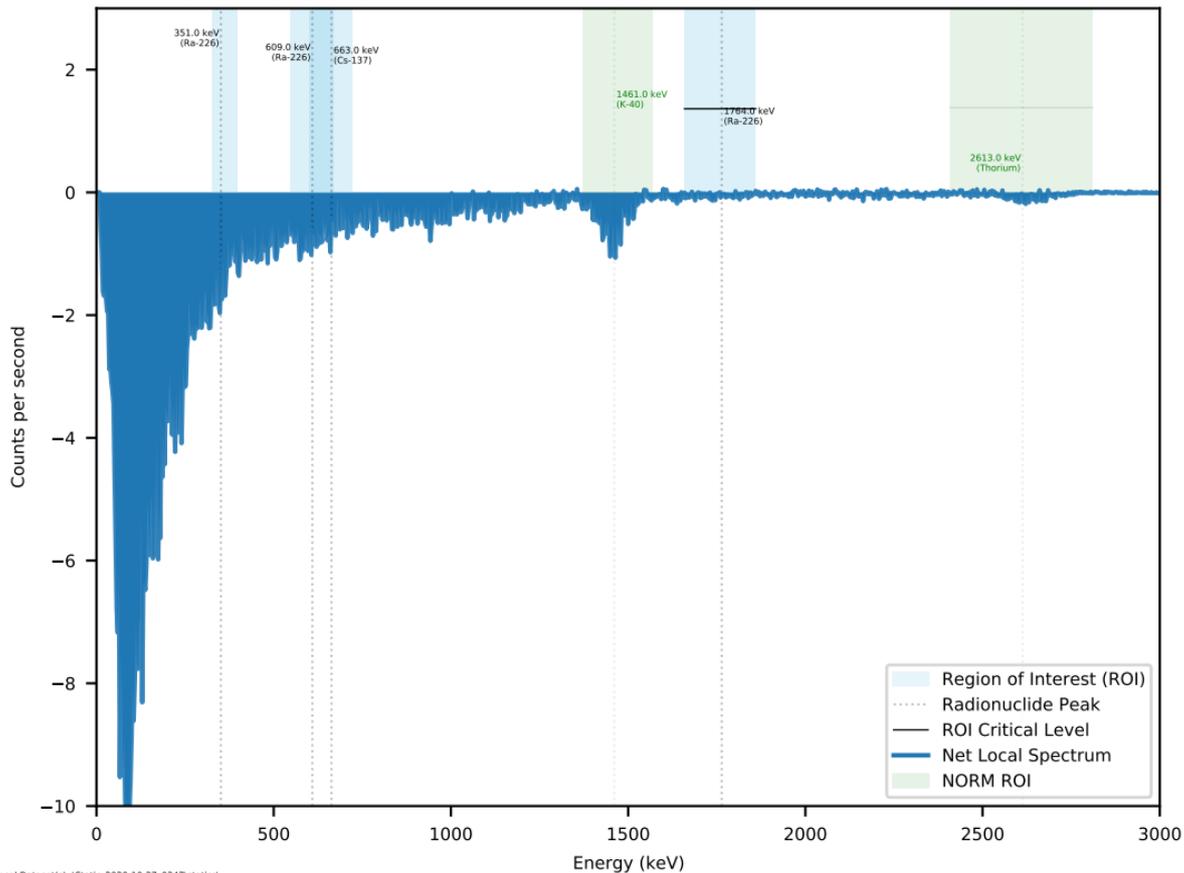


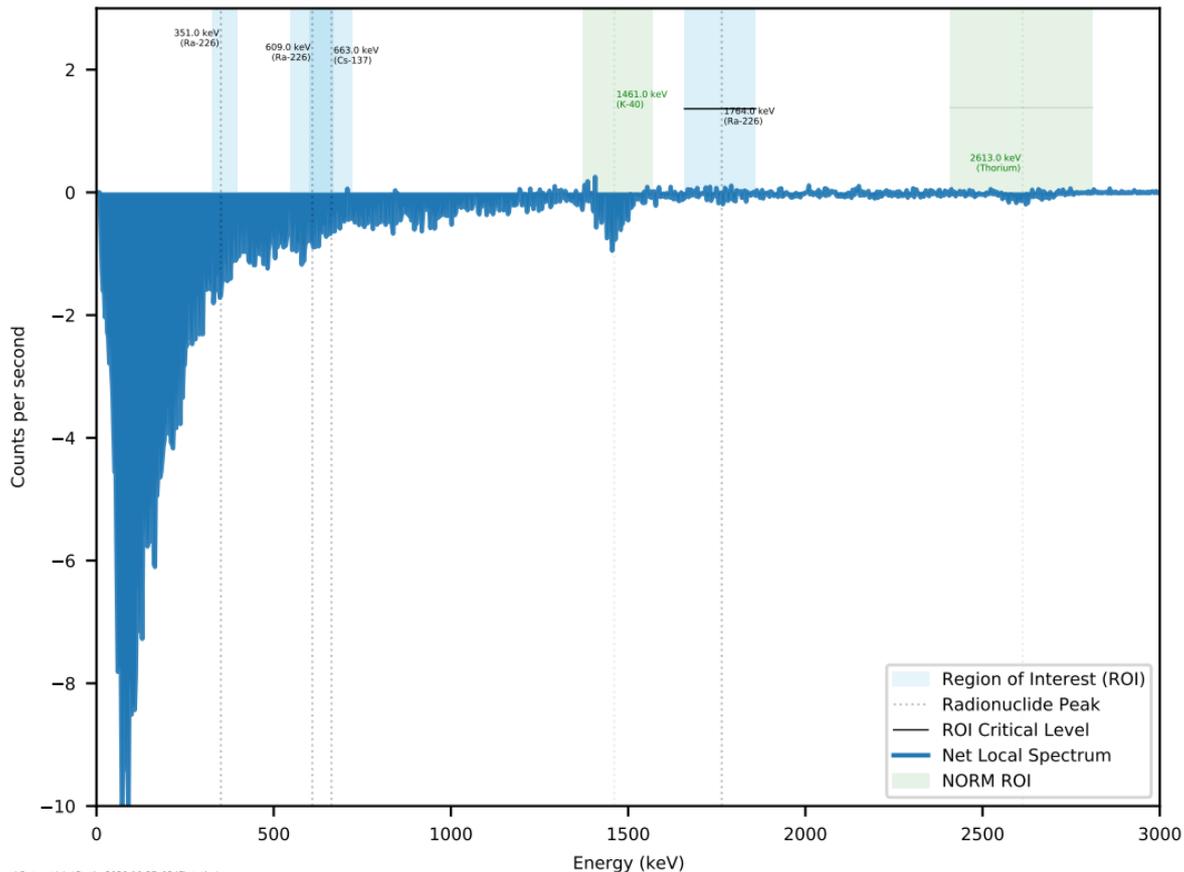


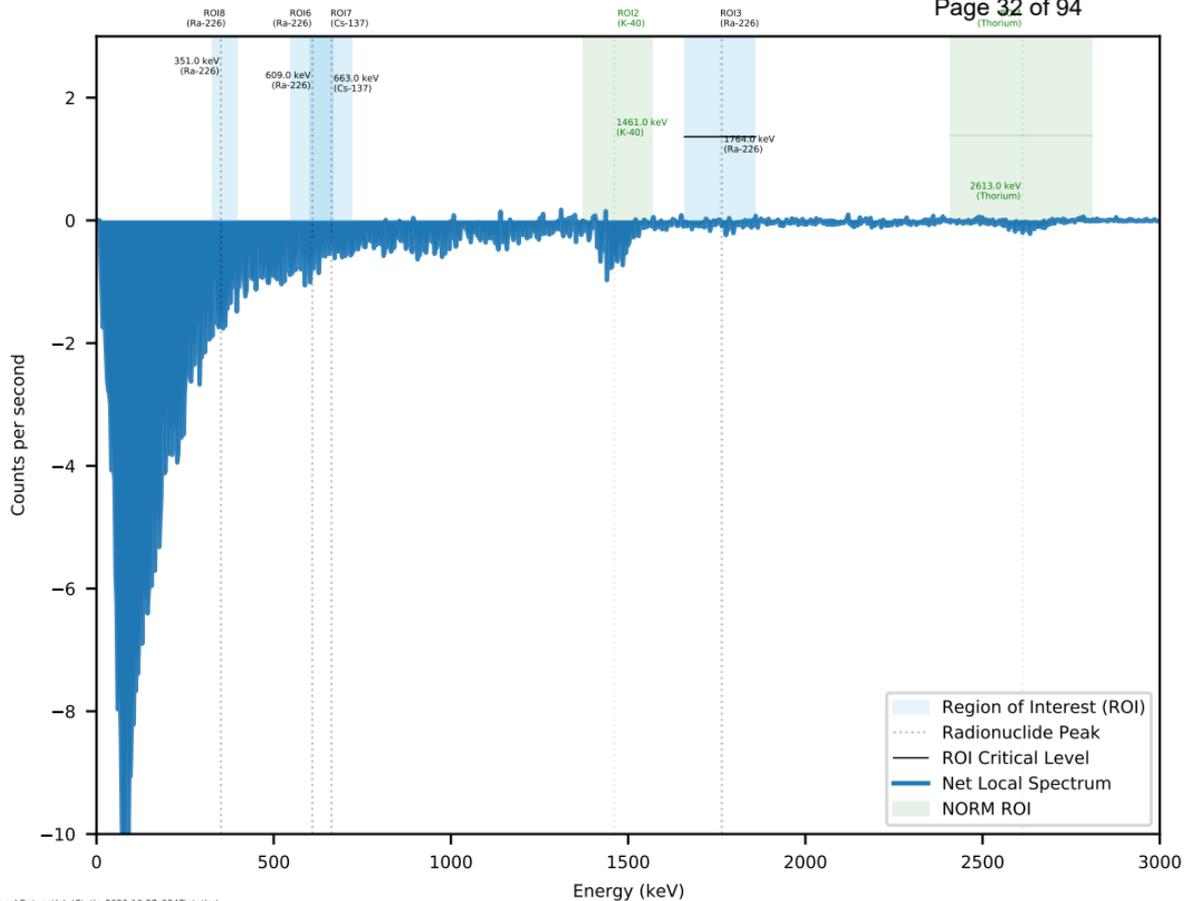


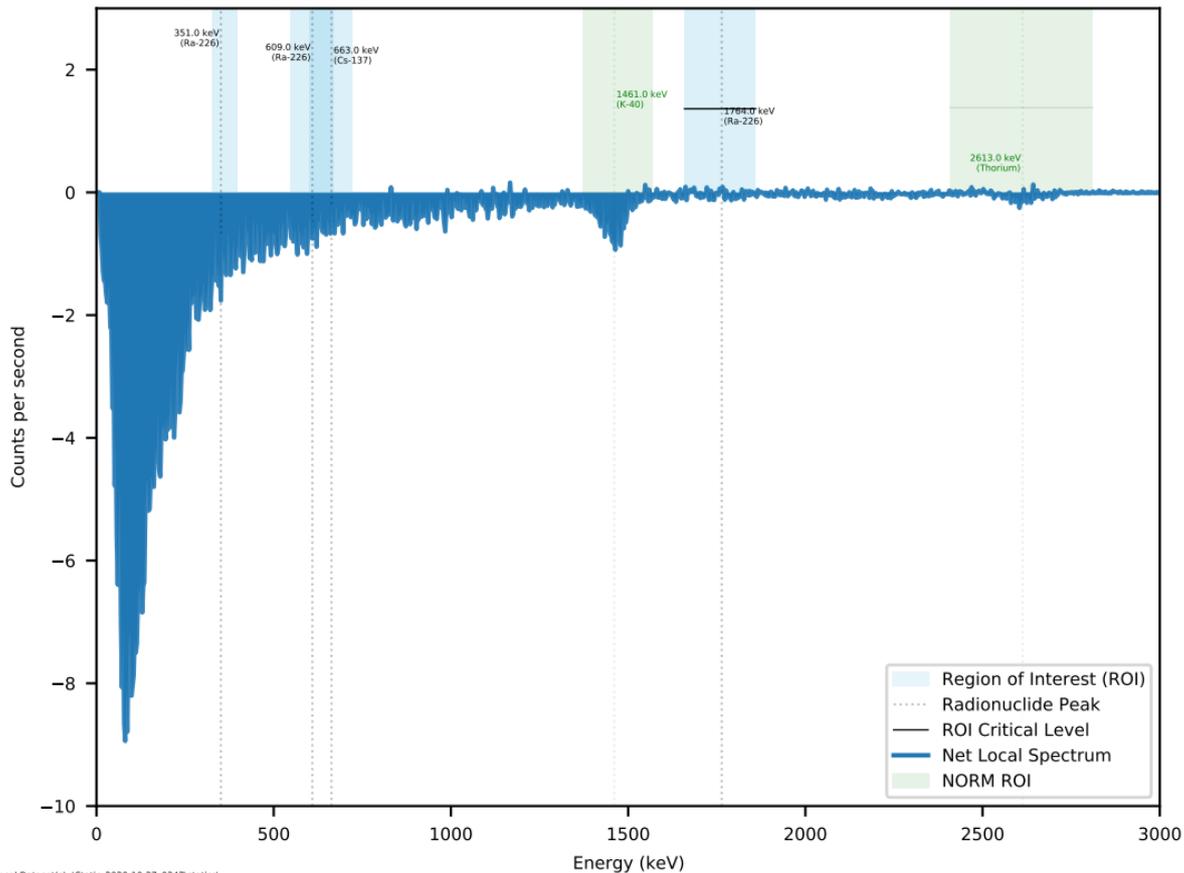


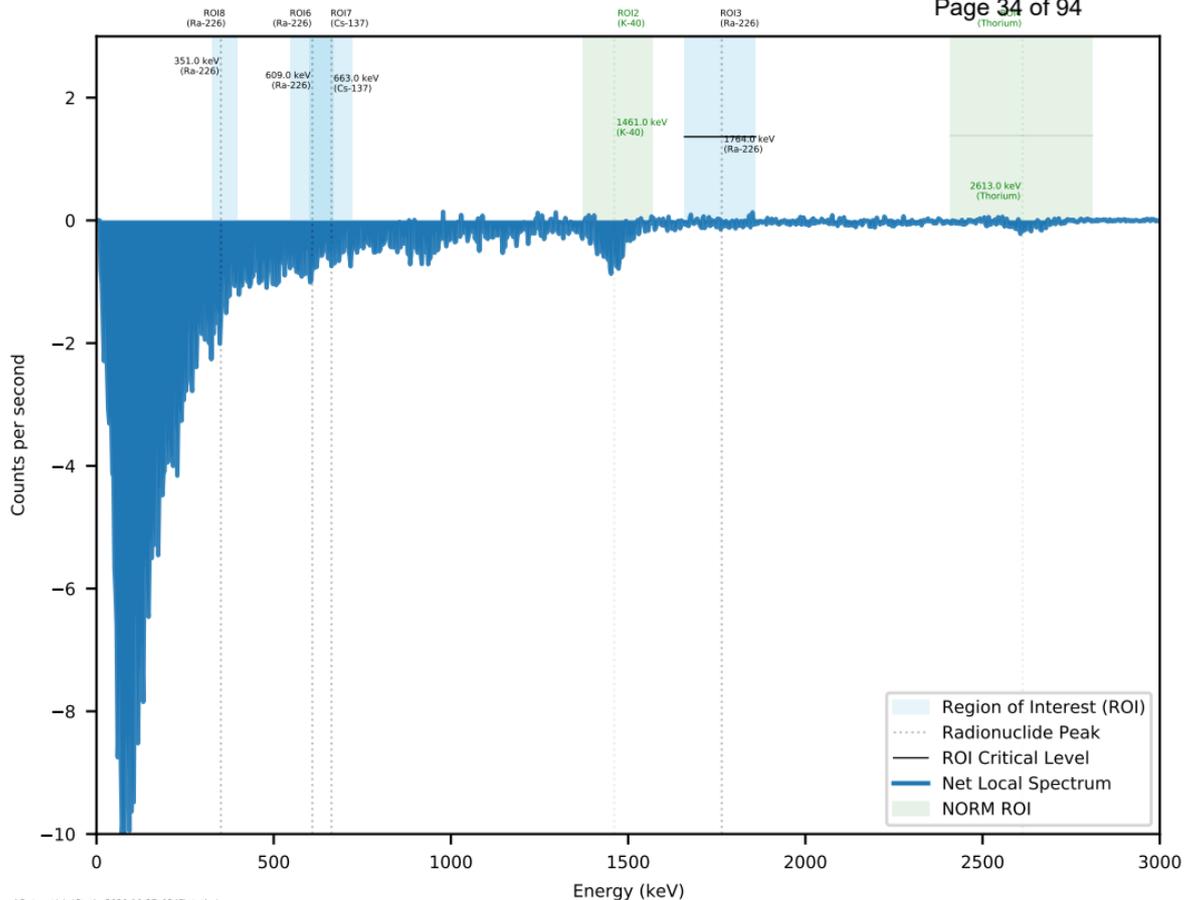


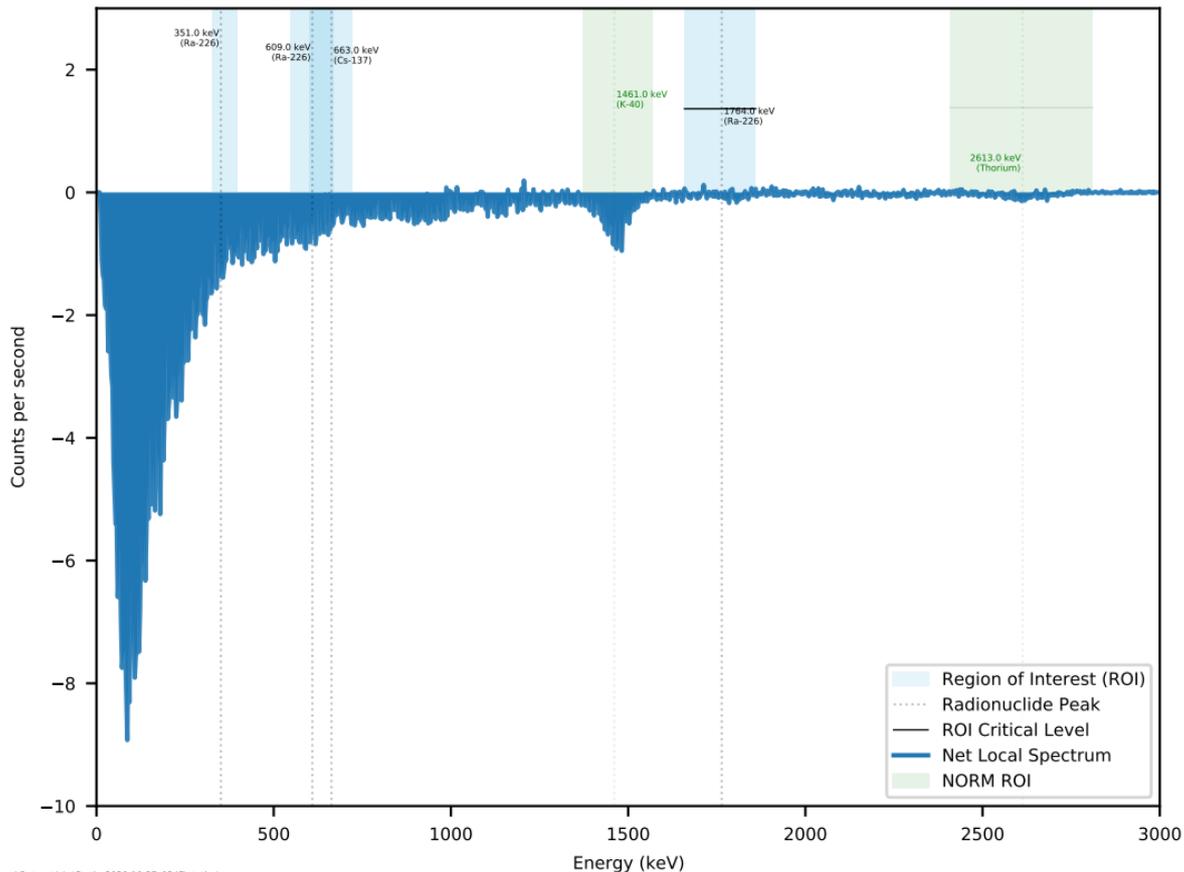


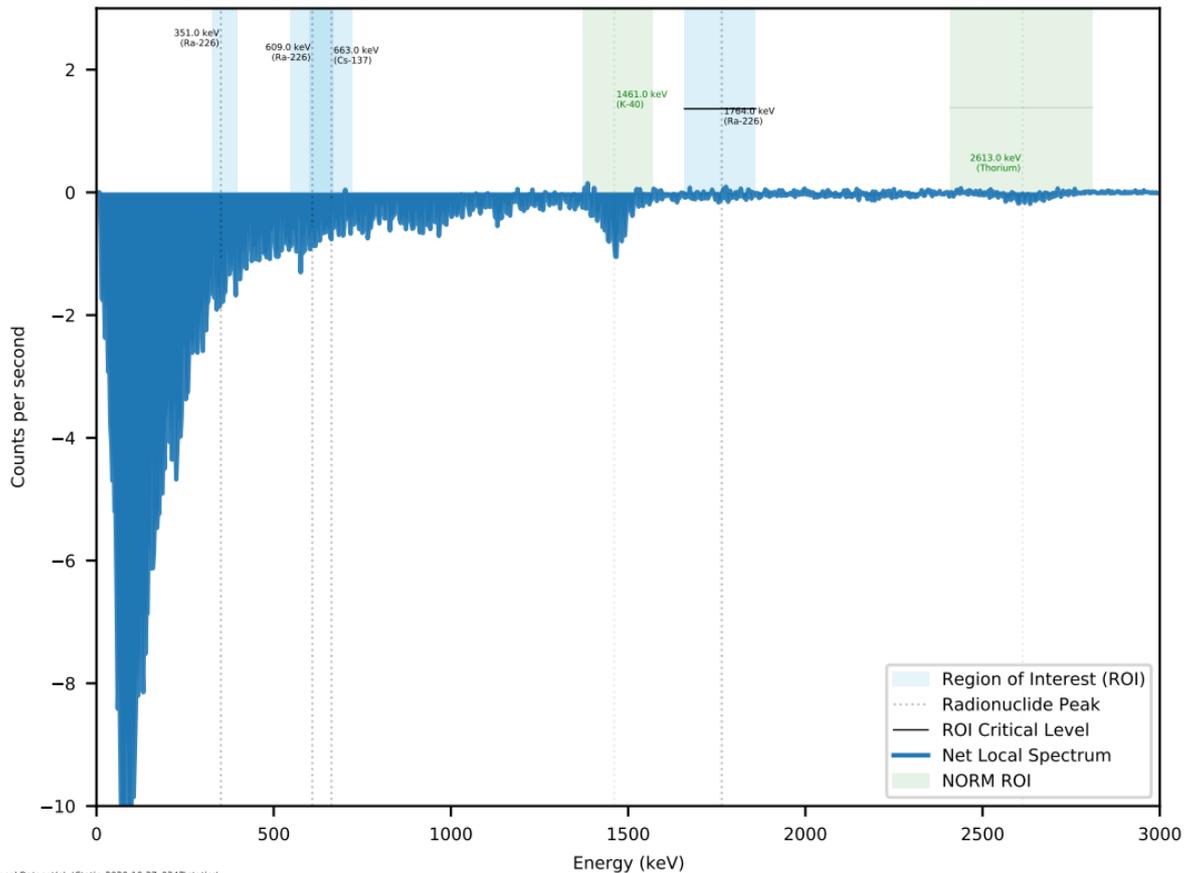


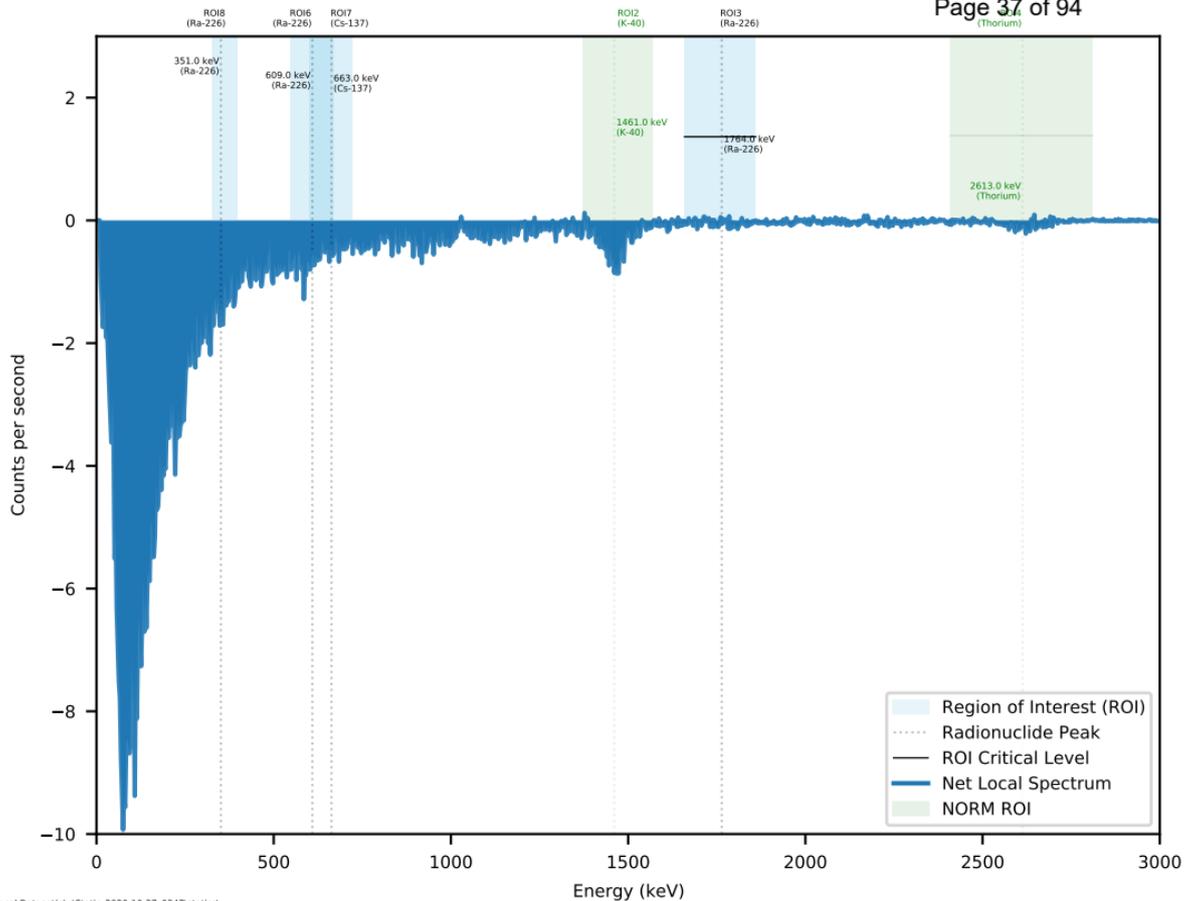


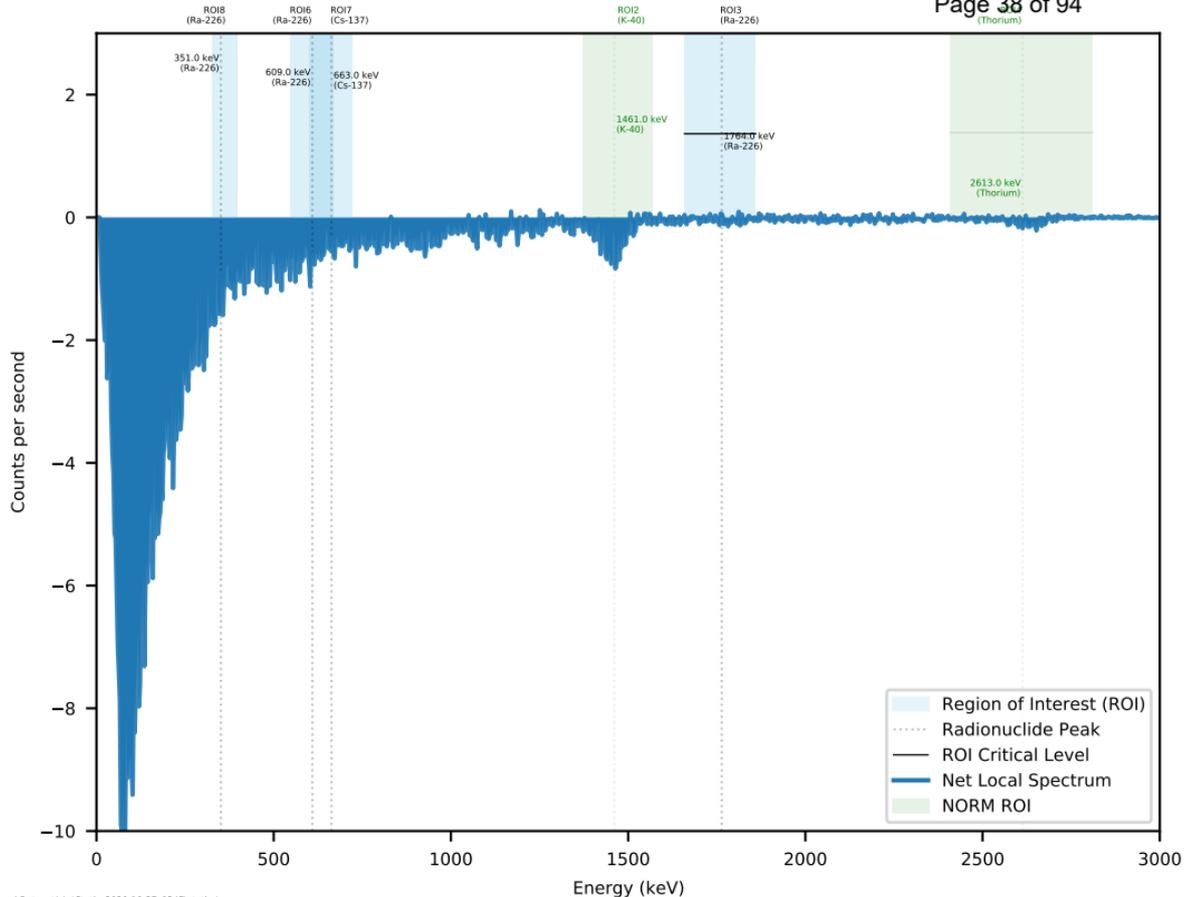


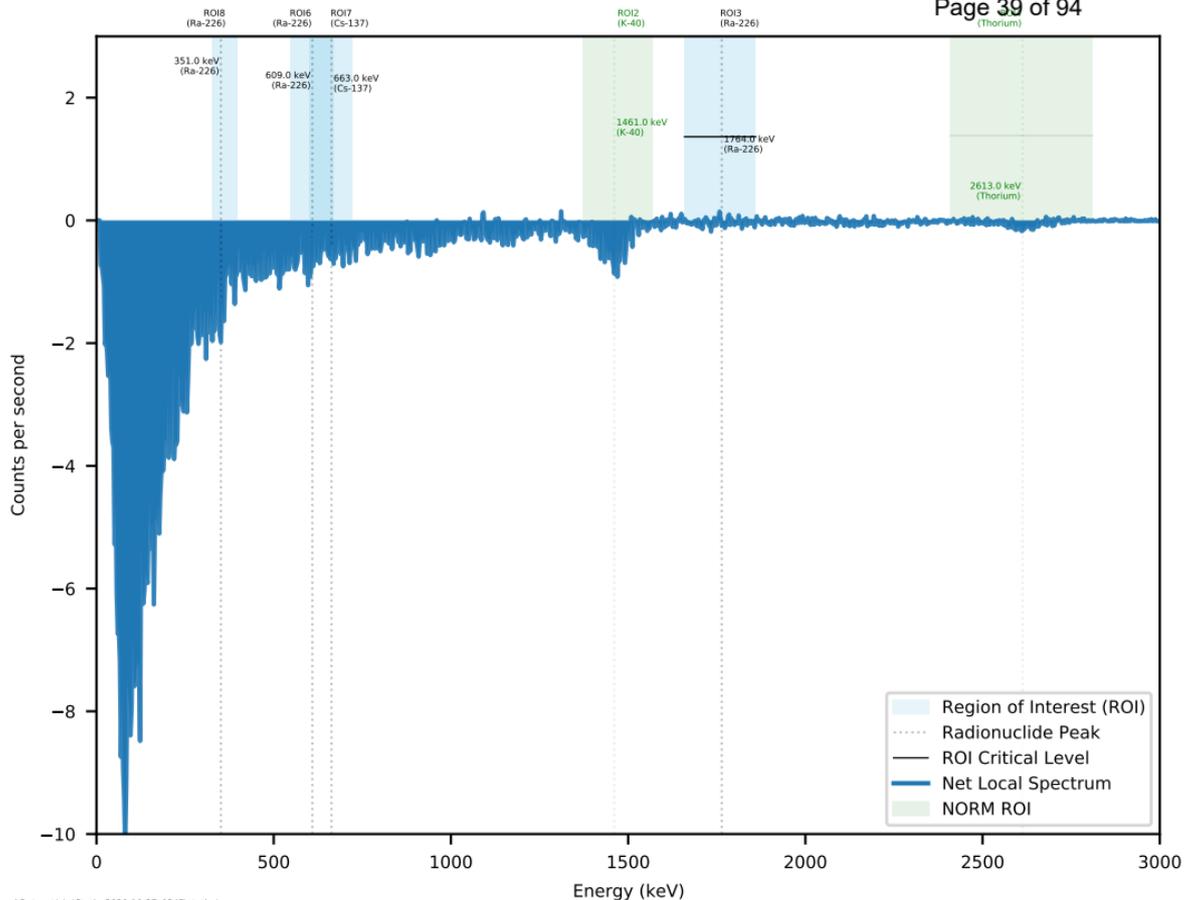


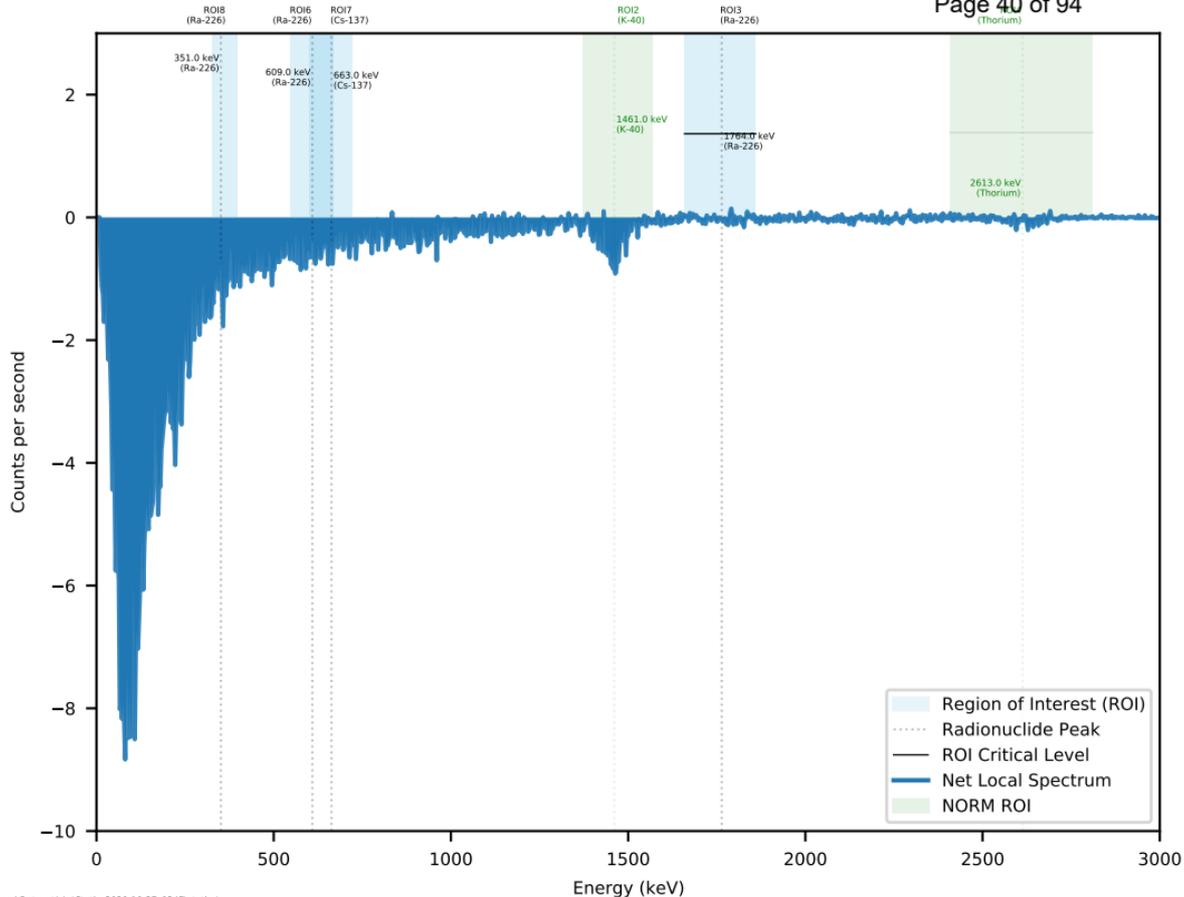


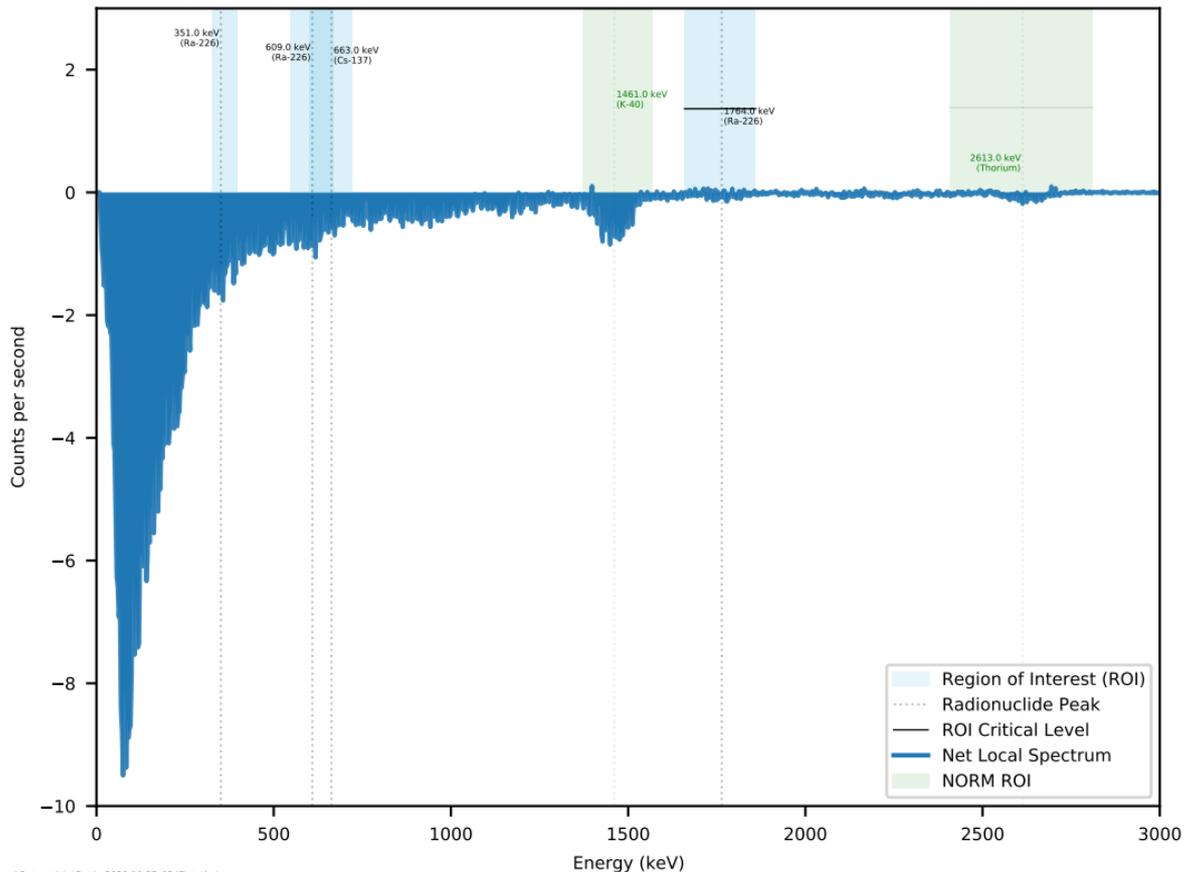














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40140-1
Laboratory Sample Delivery Group: GJ46599777
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/14/2020 3:03:27 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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results through
TotalAccess

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
SDG: GJ46599777

Job ID: 160-40140-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40140-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/28/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
SDG: GJ46599777

Job ID: 160-40140-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 15.7 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-317364365-SU28B-001 (160-40140-1), HPPG-317364365-SU28B-011 (160-40140-11) and HPPG-317364365-SU28B-021 (160-40140-21) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 11/01/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

Total Beta Strontium exceeded the RPD limit for the duplicate of sample 160-40096-1. Refer to the QC report for details.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-317364365-SU28B-001 (160-40140-1), HPPG-317364365-SU28B-011 (160-40140-11) and HPPG-317364365-SU28B-021 (160-40140-21) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 11/01/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488774/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report. HPPG-317364365-SU28B-001 (160-40140-1), HPPG-317364365-SU28B-011 (160-40140-11), HPPG-317364365-SU28B-021 (160-40140-21), (LCS 160-488774/2-A), (MB 160-488774/1-A), (160-40094-A-1-E) and (160-40094-A-1-K DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-317364365-SU28B-001 (160-40140-1), HPPG-317364365-SU28B-011 (160-40140-11) and HPPG-317364365-SU28B-021 (160-40140-21) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 11/01/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488775/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report. HPPG-317364365-SU28B-001 (160-40140-1), HPPG-317364365-SU28B-011 (160-40140-11), HPPG-317364365-SU28B-021 (160-40140-21), (LCS 160-488775/2-A), (MB 160-488775/1-A), (160-40094-A-1-G) and (160-40094-A-1-J DU)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-317364365-SU28B-001 (160-40140-1), HPPG-317364365-SU28B-002 (160-40140-2), HPPG-317364365-SU28B-003 (160-40140-3), HPPG-317364365-SU28B-004 (160-40140-4), HPPG-317364365-SU28B-005 (160-40140-5), HPPG-317364365-SU28B-006 (160-40140-6), HPPG-317364365-SU28B-007 (160-40140-7), HPPG-317364365-SU28B-008 (160-40140-8), HPPG-317364365-SU28B-009 (160-40140-9), HPPG-317364365-SU28B-010 (160-40140-10), HPPG-317364365-SU28B-011 (160-40140-11), HPPG-317364365-SU28B-012 (160-40140-12), HPPG-317364365-SU28B-013 (160-40140-13), HPPG-317364365-SU28B-014 (160-40140-14), HPPG-317364365-SU28B-015 (160-40140-15), HPPG-317364365-SU28B-016 (160-40140-16), HPPG-317364365-SU28B-017 (160-40140-17), HPPG-317364365-SU28B-018 (160-40140-18), HPPG-317364365-SU28B-019 (160-40140-19), HPPG-317364365-SU28B-020 (160-40140-20), HPPG-317364365-SU28B-021 (160-40140-21), HPPG-317364365-SU28B-022 (160-40140-22), HPPG-317364365-SU28B-023 (160-40140-23), HPPG-317364365-SU28B-024 (160-40140-24), HPPG-317364365-SU28B-025 (160-40140-25), HPPG-F-021 (160-40140-26) and HPPG-F-022 (160-40140-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/01/2020, prepared on 11/05/2020 and analyzed on 11/27/2020 and 11/28/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Job ID: 160-40140-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 488417

The method blank (MB) z-score associated with Prep Batch 160-488417 is within limits and is stored in the level IV raw data. (MB 160-488417/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-317364365-SU28B-005 (160-40140-5) and HPPG-317364365-SU28B-015 (160-40140-15)

Gamma prep batch 488430

The MB z-score for Co-60 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-488430/1-A)

The replicate precision for Ac-228/Ra-228/Th-232 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40199-A-8-C DU)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Co-60: (MB 160-488430/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

CHAIN OF CUSTODY

Ref. Document # 501197RSY-020

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/27/2020
Waybill Number: 4957 0225 4330
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Evidence Bag ID	Comment
	Date	Time	Method			Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, Isotopic U(234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr			
HPPG-317364365-SU28B-009	10/27/2020	11:14	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-010	10/27/2020	11:16	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-011	10/27/2020	11:18	G	SO	1	16 oz. plastic jar	X	X	X		X	4	GJ46599777	
HPPG-317364365-SU28B-012	10/27/2020	11:20	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-013	10/27/2020	11:21	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-014	10/27/2020	11:23	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-015	10/27/2020	11:25	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-016	10/27/2020	11:27	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-017	10/27/2020	11:29	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-018	10/27/2020	11:31	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-019	10/27/2020	11:32	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-020	10/27/2020	11:34	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-021	10/27/2020	11:35	G	SO	1	16 oz. plastic jar	X	X	X		X	4	GJ46599777	
HPPG-317364365-SU28B-022	10/27/2020	11:37	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-023	10/27/2020	11:38	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-024	10/27/2020	11:40	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	
HPPG-317364365-SU28B-025	10/27/2020	11:42	G	SO	1	16 oz. plastic jar	X					4	GJ46599777	





CHAIN OF CUSTODY

Ref. Document # 501197RSY-020

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

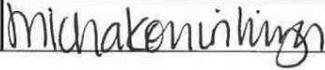
Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/27/2020
Waybill Number: 4957 0225 4330
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

		Analysis Requested						Evidence Bag ID	Comment
Matrix	# of Containers	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, Isotopic U(234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr			
		Preservatives (water)							
		Preservatives (soil)							
		Container Type							
Sample ID	Date	Time	Method	Matrix	# of Containers	Container Type			
HPPG-F-021	10/27/2020	11:02	G	SO	1	16 oz. plastic jar	X	4	GJ46599777
HPPG-F-022	10/27/2020	11:23	G	SO	1	16 oz. plastic jar	X	4	GJ46599777



All Transfers for COC 501197RSY-020

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/27/2020 16:09	SHIPPEDTOLAB FED EX		OCT 28 2020 11:30

MICHA KORRINIZER





Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40140-1
SDG Number: GJ46599777**Login Number: 40140****List Number: 1****Creator: Korrinhizer, Micha L****List Source: Eurofins TestAmerica, St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
SDG: GJ46599777

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
SDG: GJ46599777

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
SDG: GJ46599777

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40140-1	HPPG-317364365-SU28B-001	Solid	10/27/20 10:46	10/28/20 11:30	
160-40140-2	HPPG-317364365-SU28B-002	Solid	10/27/20 10:51	10/28/20 11:30	
160-40140-3	HPPG-317364365-SU28B-003	Solid	10/27/20 10:56	10/28/20 11:30	
160-40140-4	HPPG-317364365-SU28B-004	Solid	10/27/20 11:02	10/28/20 11:30	
160-40140-5	HPPG-317364365-SU28B-005	Solid	10/27/20 11:05	10/28/20 11:30	
160-40140-6	HPPG-317364365-SU28B-006	Solid	10/27/20 11:07	10/28/20 11:30	
160-40140-7	HPPG-317364365-SU28B-007	Solid	10/27/20 11:09	10/28/20 11:30	
160-40140-8	HPPG-317364365-SU28B-008	Solid	10/27/20 11:12	10/28/20 11:30	
160-40140-9	HPPG-317364365-SU28B-009	Solid	10/27/20 11:14	10/28/20 11:30	
160-40140-10	HPPG-317364365-SU28B-010	Solid	10/27/20 11:16	10/28/20 11:30	
160-40140-11	HPPG-317364365-SU28B-011	Solid	10/27/20 11:18	10/28/20 11:30	
160-40140-12	HPPG-317364365-SU28B-012	Solid	10/27/20 11:20	10/28/20 11:30	
160-40140-13	HPPG-317364365-SU28B-013	Solid	10/27/20 11:21	10/28/20 11:30	
160-40140-14	HPPG-317364365-SU28B-014	Solid	10/27/20 11:23	10/28/20 11:30	
160-40140-15	HPPG-317364365-SU28B-015	Solid	10/27/20 11:25	10/28/20 11:30	
160-40140-16	HPPG-317364365-SU28B-016	Solid	10/27/20 11:27	10/28/20 11:30	
160-40140-17	HPPG-317364365-SU28B-017	Solid	10/27/20 11:29	10/28/20 11:30	
160-40140-18	HPPG-317364365-SU28B-018	Solid	10/27/20 11:31	10/28/20 11:30	
160-40140-19	HPPG-317364365-SU28B-019	Solid	10/27/20 11:32	10/28/20 11:30	
160-40140-20	HPPG-317364365-SU28B-020	Solid	10/27/20 11:34	10/28/20 11:30	
160-40140-21	HPPG-317364365-SU28B-021	Solid	10/27/20 11:35	10/28/20 11:30	
160-40140-22	HPPG-317364365-SU28B-022	Solid	10/27/20 11:37	10/28/20 11:30	
160-40140-23	HPPG-317364365-SU28B-023	Solid	10/27/20 11:38	10/28/20 11:30	
160-40140-24	HPPG-317364365-SU28B-024	Solid	10/27/20 11:40	10/28/20 11:30	
160-40140-25	HPPG-317364365-SU28B-025	Solid	10/27/20 11:42	10/28/20 11:30	
160-40140-26	HPPG-F-021	Solid	10/27/20 11:02	10/28/20 11:30	
160-40140-27	HPPG-F-022	Solid	10/27/20 11:23	10/28/20 11:30	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-001

Lab Sample ID: 160-40140-1

Date Collected: 10/27/20 10:46

Matrix: Solid

Date Received: 10/28/20 11:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0539		0.0525	0.0527	0.160	0.0384	pCi/g	11/25/20 14:30	12/11/20 07:04	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					11/25/20 14:30	12/11/20 07:04	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0127	U	0.0232	0.0232	0.100	0.0171	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.00847	U	0.0147	0.0147	0.100	0.00986	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	85.1		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.440		0.0648	0.0746	0.250	0.0107	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.0171		0.0161	0.0162	0.100	0.00663	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	0.386		0.0612	0.0692	0.250	0.0119	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	74.4		30 - 110					11/10/20 17:08	12/07/20 15:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.397		0.153	0.159		0.0633	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Actinium-227	0.105	U	0.224	0.224		0.423	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Bismuth-212	0.446	U	0.734	0.736		0.553	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Bismuth-214	0.516		0.151	0.162		0.0503	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Cesium-137	-0.0304	U	0.0618	0.0619	0.0700	0.0654	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Lead-210	0.851	U	1.91	1.91		1.53	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Lead-212	0.406		0.101	0.112		0.0538	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Lead-214	0.496		0.134	0.145		0.0534	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Potassium-40	9.59		1.67	2.00		0.420	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Protactinium-231	0.694	U	2.19	2.20		2.40	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Protactinium-234	-0.0405	U	0.115	0.115		0.300	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Radium-226	0.516		0.151	0.162	0.200	0.0503	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Radium-228	0.397		0.153	0.159		0.0633	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Thallium-208	0.141		0.0661	0.0680		0.0293	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Thorium 228	0.406		0.101	0.112		0.0538	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Thorium-232	0.397		0.153	0.159		0.0633	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Thorium-234	0.535		0.762	0.765		0.490	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Uranium-235	0.0761	U	0.245	0.245		0.341	pCi/g	11/05/20 13:43	11/28/20 08:21	1
Uranium-238	0.535		0.762	0.765		0.490	pCi/g	11/05/20 13:43	11/28/20 08:21	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-002

Lab Sample ID: 160-40140-2

Date Collected: 10/27/20 10:51

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.104	U	0.238	0.238		0.121	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Actinium-227	0.127	U	0.326	0.326		0.250	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Bismuth-212	0.203	U	0.604	0.605		0.476	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Bismuth-214	0.403		0.106	0.114		0.0400	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Cesium-137	0.0324	U	0.0570	0.0571	0.0700	0.0439	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Lead-210	0.535	U	1.06	1.07		0.788	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Lead-212	0.288		0.0703	0.0764		0.0333	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Lead-214	0.304		0.0948	0.0997		0.0424	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Potassium-40	7.05		1.13	1.33		0.105	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Protactinium-231	-0.805	U	2.70	2.70		2.20	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Protactinium-234	0.0460	U	0.0983	0.0984		0.192	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Radium-226	0.403		0.106	0.114	0.200	0.0400	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Radium-228	0.104	U	0.238	0.238		0.121	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Thallium-208	0.170		0.0442	0.0474		0.00670	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Thorium 228	0.288		0.0703	0.0764		0.0333	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Thorium-232	0.104	U	0.238	0.238		0.121	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Thorium-234	-0.198	U	0.603	0.604		0.504	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Uranium-235	0.0868	U	0.173	0.174		0.303	pCi/g	11/05/20 13:43	11/28/20 09:00	1
Uranium-238	-0.198	U	0.603	0.604		0.504	pCi/g	11/05/20 13:43	11/28/20 09:00	1

Client Sample ID: HPPG-317364365-SU28B-003

Lab Sample ID: 160-40140-3

Date Collected: 10/27/20 10:56

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.393		0.115	0.121		0.0195	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Actinium-227	0.0893	U	0.194	0.194		0.230	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Bismuth-212	0.153	U	0.330	0.330		0.250	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Bismuth-214	0.0759	U	0.0978	0.0981		0.123	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Cesium-137	0.0243	U	0.0442	0.0443	0.0700	0.0344	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Lead-210	0.482	U	1.05	1.05		0.841	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Lead-212	0.305		0.0599	0.0717		0.0262	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Lead-214	0.349		0.0788	0.0868		0.0436	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Potassium-40	7.39		0.988	1.24		0.0769	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Protactinium-231	0.392	U	1.25	1.25		1.36	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Protactinium-234	0.0685	U	0.193	0.193		0.156	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Radium-226	0.0759	U	0.0978	0.0981	0.200	0.123	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Radium-228	0.393		0.115	0.121		0.0195	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Thallium-208	0.0685		0.0588	0.0592		0.0252	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Thorium 228	0.305		0.0599	0.0717		0.0262	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Thorium-232	0.393		0.115	0.121		0.0195	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Thorium-234	-0.0207	U	0.119	0.119		0.734	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Uranium-235	-0.141	U	0.373	0.373		0.303	pCi/g	11/05/20 13:43	11/28/20 09:01	1
Uranium-238	-0.0207	U	0.119	0.119		0.734	pCi/g	11/05/20 13:43	11/28/20 09:01	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-004

Lab Sample ID: 160-40140-4

Date Collected: 10/27/20 11:02

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.156		0.282	0.282		0.149	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Actinium-227	0.543		0.270	0.278		0.0978	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Bismuth-212	0.000	U	0.219	0.219		0.326	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Bismuth-214	0.237		0.110	0.113		0.0471	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Cesium-137	0.0347	U	0.0632	0.0633	0.0700	0.0487	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Lead-210	-0.912	U	0.599	0.609		1.17	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Lead-212	0.296		0.104	0.111		0.0487	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Lead-214	0.191		0.117	0.118		0.0815	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Potassium-40	9.19		1.46	1.73		0.135	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Protactinium-231	0.000	U	0.800	0.800		2.44	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Protactinium-234	0.296		0.199	0.202		0.187	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Radium-226	0.237		0.110	0.113	0.200	0.0471	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Radium-228	0.156		0.282	0.282		0.149	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Thallium-208	0.112		0.0762	0.0771		0.0330	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Thorium 228	0.296		0.104	0.111		0.0487	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Thorium-232	0.156		0.282	0.282		0.149	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Thorium-234	-0.460	U	0.757	0.759		0.910	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Uranium-235	0.0718	U	0.165	0.165		0.400	pCi/g	11/05/20 13:43	11/28/20 09:02	1
Uranium-238	-0.460	U	0.757	0.759		0.910	pCi/g	11/05/20 13:43	11/28/20 09:02	1

Client Sample ID: HPPG-317364365-SU28B-005

Lab Sample ID: 160-40140-5

Date Collected: 10/27/20 11:05

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.271		0.278	0.279		0.146	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Actinium-227	0.158	U	0.381	0.381		0.305	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Bismuth-212	0.193	U	0.393	0.394		0.291	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Bismuth-214	0.337		0.116	0.121		0.0507	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Cesium-137	-0.0511	U	0.0888	0.0890	0.0700	0.0701	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Lead-210	-0.616	U	1.56	1.56		1.31	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Lead-212	0.218		0.0925	0.0967		0.0632	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Lead-214	0.386		0.0982	0.106		0.0547	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Potassium-40	9.43		1.36	1.67		0.278	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Protactinium-231	0.267	U	1.30	1.30		2.02	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Protactinium-234	0.0829	U	0.259	0.260		0.211	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Radium-226	0.337		0.116	0.121	0.200	0.0507	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Radium-228	0.271		0.278	0.279		0.146	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Thallium-208	0.0750		0.0697	0.0701		0.0372	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Thorium 228	0.218		0.0925	0.0967		0.0632	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Thorium-232	0.271		0.278	0.279		0.146	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Thorium-234	-1.02	U	0.874	0.881		0.859	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Uranium-235	0.0480	U	0.209	0.209		0.368	pCi/g	11/05/20 13:43	11/28/20 09:03	1
Uranium-238	-1.02	U	0.874	0.881		0.859	pCi/g	11/05/20 13:43	11/28/20 09:03	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-006

Lab Sample ID: 160-40140-6

Date Collected: 10/27/20 11:07

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.179		0.175	0.176		0.0851	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Actinium-227	0.127	U	0.349	0.349		0.311	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Bismuth-212	-0.316	U	0.874	0.874		0.688	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Bismuth-214	0.309		0.122	0.126		0.0544	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Cesium-137	0.00933	U	0.0842	0.0842	0.0700	0.0684	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Lead-210	1.75		0.991	1.01		0.571	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Lead-212	0.260		0.0852	0.0916		0.0492	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Lead-214	0.366		0.112	0.119		0.0517	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Potassium-40	7.52		1.44	1.63		0.254	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Protactinium-231	0.000	U	0.916	0.916		1.90	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Protactinium-234	0.0739	U	0.172	0.172		0.146	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Radium-226	0.309		0.122	0.126	0.200	0.0544	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Radium-228	0.179		0.175	0.176		0.0851	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Thallium-208	0.118		0.0508	0.0522		0.0167	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Thorium 228	0.260		0.0852	0.0916		0.0492	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Thorium-232	0.179		0.175	0.176		0.0851	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Thorium-234	0.444		0.429	0.431		0.319	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Uranium-235	0.0896	U	0.252	0.252		0.197	pCi/g	11/05/20 13:43	11/28/20 09:46	1
Uranium-238	0.444		0.429	0.431		0.319	pCi/g	11/05/20 13:43	11/28/20 09:46	1

Client Sample ID: HPPG-317364365-SU28B-007

Lab Sample ID: 160-40140-7

Date Collected: 10/27/20 11:09

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.297		0.272	0.274		0.160	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Actinium-227	0.0456	U	0.571	0.571		0.330	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Bismuth-212	-0.593	U	0.942	0.944		0.726	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Bismuth-214	0.431		0.136	0.145		0.0481	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Cesium-137	-0.0497	U	0.0470	0.0474	0.0700	0.0623	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Lead-210	1.83		2.01	2.03		1.17	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Lead-212	0.316		0.0926	0.0998		0.0531	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Lead-214	0.486		0.114	0.127		0.0598	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Potassium-40	8.06		1.38	1.66		0.272	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Protactinium-231	-0.928	U	3.10	3.10		2.53	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Protactinium-234	0.0325	U	0.152	0.152		0.260	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Radium-226	0.431		0.136	0.145	0.200	0.0481	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Radium-228	0.297		0.272	0.274		0.160	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Thallium-208	0.152		0.0780	0.0799		0.0372	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Thorium 228	0.316		0.0926	0.0998		0.0531	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Thorium-232	0.297		0.272	0.274		0.160	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Thorium-234	1.22		0.714	0.730		0.412	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Uranium-235	0.0916	U	0.211	0.211		0.443	pCi/g	11/05/20 13:43	11/28/20 09:04	1
Uranium-238	1.22		0.714	0.730		0.412	pCi/g	11/05/20 13:43	11/28/20 09:04	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-008

Lab Sample ID: 160-40140-8

Date Collected: 10/27/20 11:12

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.155		0.170	0.170		0.0852	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Actinium-227	-0.251	U	0.487	0.488		0.281	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Bismuth-212	0.155	U	0.318	0.318		0.238	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Bismuth-214	0.338		0.108	0.114		0.0414	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Cesium-137	-0.0276	U	0.0447	0.0448	0.0700	0.0344	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Lead-210	0.526	U	1.16	1.17		0.935	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Lead-212	0.328		0.101	0.109		0.0703	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Lead-214	0.300		0.0795	0.0854		0.0334	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Potassium-40	8.65		1.12	1.43		0.223	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Protactinium-231	-0.0000001	U	1.90	1.90		1.57	pCi/g	11/05/20 13:43	11/28/20 09:48	1
	48									
Protactinium-234	0.0725	U	0.207	0.208		0.158	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Radium-226	0.338		0.108	0.114	0.200	0.0414	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Radium-228	0.155		0.170	0.170		0.0852	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Thallium-208	0.123		0.0394	0.0415		0.0118	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Thorium 228	0.328		0.101	0.109		0.0703	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Thorium-232	0.155		0.170	0.170		0.0852	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Thorium-234	0.113	U	0.726	0.726		0.681	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Uranium-235	-0.148	U	0.429	0.430		0.350	pCi/g	11/05/20 13:43	11/28/20 09:48	1
Uranium-238	0.113	U	0.726	0.726		0.681	pCi/g	11/05/20 13:43	11/28/20 09:48	1

Client Sample ID: HPPG-317364365-SU28B-009

Lab Sample ID: 160-40140-9

Date Collected: 10/27/20 11:14

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.264		0.115	0.118		0.0292	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Actinium-227	-0.256	U	0.597	0.598		0.361	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Bismuth-212	0.382	U	0.649	0.650		0.493	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Bismuth-214	0.364		0.116	0.122		0.0501	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Cesium-137	-0.0169	U	0.0653	0.0654	0.0700	0.0524	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-210	1.17		1.40	1.41		0.944	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-212	0.404		0.0849	0.0948		0.0385	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-214	0.341		0.109	0.114		0.0494	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Potassium-40	6.91		1.63	1.78		0.556	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Protactinium-231	0.000	U	0.472	0.472		2.25	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Protactinium-234	-0.106	U	0.321	0.321		0.261	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Radium-226	0.364		0.116	0.122	0.200	0.0501	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Radium-228	0.264		0.115	0.118		0.0292	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thallium-208	0.189		0.0624	0.0653		0.0201	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium 228	0.404		0.0849	0.0948		0.0385	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium-232	0.264		0.115	0.118		0.0292	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium-234	0.296	U	0.251	0.254		0.780	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Uranium-235	0.106	U	0.212	0.213		0.276	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Uranium-238	0.296	U	0.251	0.254		0.780	pCi/g	11/05/20 13:43	11/28/20 09:50	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-010

Lab Sample ID: 160-40140-10

Date Collected: 10/27/20 11:16

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.311		0.101	0.106		0.0191	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Actinium-227	0.0512	U	0.340	0.340		0.226	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Bismuth-212	-0.415	U	0.671	0.673		0.526	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Bismuth-214	0.262		0.0737	0.0786		0.0342	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Cesium-137	0.0119	U	0.0340	0.0340	0.0700	0.0267	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Lead-210	0.0919	U	1.10	1.10		0.906	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Lead-212	0.0375	U	0.0919	0.0920		0.0743	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Lead-214	0.343		0.0951	0.102		0.0399	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Potassium-40	8.24		1.03	1.33		0.0753	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Protactinium-231	-0.0634	U	0.145	0.145		1.59	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Protactinium-234	0.0342	U	0.0582	0.0583		0.174	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Radium-226	0.262		0.0737	0.0786	0.200	0.0342	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Radium-228	0.311		0.101	0.106		0.0191	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thallium-208	0.117		0.0331	0.0352		0.00762	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thorium 228	0.0375	U	0.0919	0.0920		0.0743	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thorium-232	0.311		0.101	0.106		0.0191	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thorium-234	0.0110	U	0.0230	0.0231		0.700	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Uranium-235	-0.0809	U	0.363	0.363		0.297	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Uranium-238	0.0110	U	0.0230	0.0231		0.700	pCi/g	11/05/20 13:43	11/28/20 09:51	1

Client Sample ID: HPPG-317364365-SU28B-011

Lab Sample ID: 160-40140-11

Date Collected: 10/27/20 11:18

Matrix: Solid

Date Received: 10/28/20 11:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.000549	U	0.0496	0.0496	0.160	0.0407	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	-0.00585	U	0.0151	0.0151	0.100	0.0136	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.00662	U	0.0117	0.0117	0.100	0.00726	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	87.1		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.430		0.0610	0.0709	0.250	0.0108	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.0283		0.0171	0.0172	0.100	0.00598	pCi/g	11/10/20 17:08	12/07/20 15:14	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-011

Lab Sample ID: 160-40140-11

Date Collected: 10/27/20 11:18

Matrix: Solid

Date Received: 10/28/20 11:30

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-238	0.411		0.0582	0.0677	0.250	0.00480	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	85.7		30 - 110					11/10/20 17:08	12/07/20 15:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.589		0.184	0.194		0.0324	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Actinium-227	0.123	U	0.496	0.497		0.289	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Bismuth-212	0.352	U	0.563	0.565		0.416	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Bismuth-214	0.261		0.0991	0.103		0.0454	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Cesium-137	0.0443	U	0.0764	0.0765	0.0700	0.0594	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-210	-0.160	U	1.49	1.49		1.23	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-212	0.285		0.0835	0.0913		0.0472	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-214	0.393		0.112	0.120		0.0477	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Potassium-40	7.88		1.34	1.57		0.133	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Protactinium-231	0.000	U	0.456	0.456		2.13	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Protactinium-234	-0.117	U	0.307	0.307		0.249	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Radium-226	0.261		0.0991	0.103	0.200	0.0454	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Radium-228	0.589		0.184	0.194		0.0324	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thallium-208	0.124		0.0450	0.0468		0.0156	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium 228	0.285		0.0835	0.0913		0.0472	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium-232	0.589		0.184	0.194		0.0324	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium-234	-0.454	U	0.645	0.647		1.00	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Uranium-235	-0.0189	U	0.215	0.215		0.468	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Uranium-238	-0.454	U	0.645	0.647		1.00	pCi/g	11/05/20 13:43	11/28/20 09:50	1

Client Sample ID: HPPG-317364365-SU28B-012

Lab Sample ID: 160-40140-12

Date Collected: 10/27/20 11:20

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.255		0.155	0.157		0.0738	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Actinium-227	0.0678	U	0.174	0.174		0.308	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Bismuth-212	-0.294	U	0.654	0.655		0.513	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Bismuth-214	0.280		0.119	0.122		0.0551	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Cesium-137	0.00195	U	0.0448	0.0448	0.0700	0.0367	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Lead-210	-0.942	U	1.46	1.47		1.24	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Lead-212	0.201		0.0736	0.0781		0.0470	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Lead-214	0.286		0.0908	0.0955		0.0418	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Potassium-40	6.57		1.08	1.27		0.244	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Protactinium-231	-0.647	U	2.25	2.25		1.83	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Protactinium-234	0.0664	U	0.218	0.219		0.178	pCi/g	11/05/20 13:43	11/28/20 09:51	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-012

Lab Sample ID: 160-40140-12

Date Collected: 10/27/20 11:20

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.280		0.119	0.122	0.200	0.0551	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Radium-228	0.255		0.155	0.157		0.0738	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thallium-208	0.105		0.0648	0.0657		0.0302	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thorium 228	0.201		0.0736	0.0781		0.0470	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thorium-232	0.255		0.155	0.157		0.0738	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Thorium-234	-0.866	U	0.491	0.500		0.769	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Uranium-235	0.105	U	0.383	0.383		0.312	pCi/g	11/05/20 13:43	11/28/20 09:51	1
Uranium-238	-0.866	U	0.491	0.500		0.769	pCi/g	11/05/20 13:43	11/28/20 09:51	1

Client Sample ID: HPPG-317364365-SU28B-013

Lab Sample ID: 160-40140-13

Date Collected: 10/27/20 11:21

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.336		0.181	0.185		0.141	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Actinium-227	0.0640	U	0.198	0.198		0.369	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Bismuth-212	0.240	U	0.674	0.674		0.527	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Bismuth-214	0.411		0.145	0.152		0.0581	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Cesium-137	0.0247	U	0.0551	0.0552	0.0700	0.0424	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-210	1.13		1.62	1.62		0.975	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-212	0.254		0.0947	0.0993		0.0446	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Lead-214	0.287		0.139	0.143		0.0942	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Potassium-40	6.05		1.20	1.39		0.270	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Protactinium-231	0.737	U	2.24	2.25		1.82	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Protactinium-234	-0.118	U	0.357	0.357		0.290	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Radium-226	0.411		0.145	0.152	0.200	0.0581	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Radium-228	0.336		0.181	0.185		0.141	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thallium-208	0.135		0.0669	0.0687		0.0281	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium 228	0.254		0.0947	0.0993		0.0446	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium-232	0.336		0.181	0.185		0.141	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Thorium-234	-0.125	U	0.926	0.926		0.765	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Uranium-235	0.114	U	0.470	0.470		0.511	pCi/g	11/05/20 13:43	11/28/20 09:50	1
Uranium-238	-0.125	U	0.926	0.926		0.765	pCi/g	11/05/20 13:43	11/28/20 09:50	1

Client Sample ID: HPPG-317364365-SU28B-014

Lab Sample ID: 160-40140-14

Date Collected: 10/27/20 11:23

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.375		0.143	0.148		0.118	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Actinium-227	0.146	U	0.317	0.317		0.298	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Bismuth-212	0.0121	U	0.638	0.638		0.524	pCi/g	11/05/20 13:43	11/28/20 10:47	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-014

Lab Sample ID: 160-40140-14

Date Collected: 10/27/20 11:23

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.0622	U	0.126	0.126		0.158	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Cesium-137	0.00399	U	0.0642	0.0642	0.0700	0.0526	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Lead-210	-0.620	U	1.46	1.46		1.22	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Lead-212	0.360		0.0893	0.101		0.0508	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Lead-214	0.430		0.0903	0.101		0.0492	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Potassium-40	8.40		1.26	1.52		0.266	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Protactinium-231	-0.709	U	2.48	2.48		2.02	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Protactinium-234	0.0203	U	0.0687	0.0687		0.146	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Radium-226	0.0622	U	0.126	0.126	0.200	0.158	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Radium-228	0.375		0.143	0.148		0.118	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Thallium-208	0.0771		0.0588	0.0594		0.0313	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Thorium 228	0.360		0.0893	0.101		0.0508	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Thorium-232	0.375		0.143	0.148		0.118	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Thorium-234	0.557		0.432	0.436		0.372	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Uranium-235	-0.0155	U	0.261	0.261		0.256	pCi/g	11/05/20 13:43	11/28/20 10:47	1
Uranium-238	0.557		0.432	0.436		0.372	pCi/g	11/05/20 13:43	11/28/20 10:47	1

Client Sample ID: HPPG-317364365-SU28B-015

Lab Sample ID: 160-40140-15

Date Collected: 10/27/20 11:25

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.476		0.194	0.200		0.147	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Actinium-227	0.167	U	0.358	0.359		0.283	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Bismuth-212	0.379	U	1.05	1.05		0.835	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Bismuth-214	0.393		0.124	0.130		0.0474	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Cesium-137	-0.00960	U	0.0936	0.0936	0.0700	0.0776	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Lead-210	-0.354	U	1.24	1.24		0.894	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Lead-212	0.299		0.0814	0.0901		0.0389	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Lead-214	0.271		0.0927	0.0969		0.0460	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Potassium-40	7.42		1.45	1.64		0.262	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Protactinium-231	0.436	U	1.71	1.71		1.83	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Protactinium-234	0.0652	U	0.171	0.171		0.137	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Radium-226	0.393		0.124	0.130	0.200	0.0474	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Radium-228	0.476		0.194	0.200		0.147	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Thallium-208	0.0369	U	0.0736	0.0737		0.0417	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Thorium 228	0.299		0.0814	0.0901		0.0389	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Thorium-232	0.476		0.194	0.200		0.147	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Thorium-234	-0.367	U	0.842	0.843		0.705	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Uranium-235	0.196		0.196	0.197		0.122	pCi/g	11/05/20 13:43	11/28/20 10:40	1
Uranium-238	-0.367	U	0.842	0.843		0.705	pCi/g	11/05/20 13:43	11/28/20 10:40	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-016

Lab Sample ID: 160-40140-16

Date Collected: 10/27/20 11:27

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.275		0.210	0.212		0.107	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Actinium-227	0.0955	U	0.447	0.447		0.331	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Bismuth-212	0.000	U	0.549	0.549		0.572	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Bismuth-214	0.355		0.113	0.119		0.0526	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Cesium-137	-0.0198	U	0.0657	0.0657	0.0700	0.0525	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Lead-210	-0.781	U	1.62	1.62		1.36	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Lead-212	0.414		0.0828	0.0934		0.0366	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Lead-214	0.355		0.118	0.123		0.0517	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Potassium-40	9.84		1.40	1.72		0.206	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Protactinium-231	0.648	U	1.85	1.85		2.03	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Protactinium-234	0.0670	U	0.257	0.257		0.226	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Radium-226	0.355		0.113	0.119	0.200	0.0526	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Radium-228	0.275		0.210	0.212		0.107	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Thallium-208	0.128		0.0682	0.0695		0.0320	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Thorium 228	0.414		0.0828	0.0934		0.0366	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Thorium-232	0.275		0.210	0.212		0.107	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Thorium-234	0.287	U	0.318	0.319		0.678	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Uranium-235	0.114	U	0.242	0.243		0.357	pCi/g	11/05/20 13:43	11/28/20 10:41	1
Uranium-238	0.287	U	0.318	0.319		0.678	pCi/g	11/05/20 13:43	11/28/20 10:41	1

Client Sample ID: HPPG-317364365-SU28B-017

Lab Sample ID: 160-40140-17

Date Collected: 10/27/20 11:29

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.344		0.107	0.113		0.0195	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Actinium-227	0.127	U	0.283	0.283		0.240	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Bismuth-212	-0.194	U	0.524	0.524		0.415	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Bismuth-214	0.318		0.0893	0.0952		0.0362	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Cesium-137	-0.0273	U	0.0457	0.0457	0.0700	0.0353	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Lead-210	-0.532	U	1.15	1.16		0.927	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Lead-212	0.0373	U	0.0857	0.0858		0.0690	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Lead-214	0.220		0.0816	0.0847		0.0394	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Potassium-40	9.03		1.09	1.43		0.0771	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Protactinium-231	-0.654	U	1.98	1.98		1.61	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Protactinium-234	0.0922	U	0.141	0.141		0.159	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Radium-226	0.318		0.0893	0.0952	0.200	0.0362	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Radium-228	0.344		0.107	0.113		0.0195	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Thallium-208	0.105		0.0376	0.0391		0.0126	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Thorium 228	0.0373	U	0.0857	0.0858		0.0690	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Thorium-232	0.344		0.107	0.113		0.0195	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Thorium-234	0.107	U	0.390	0.390		0.698	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Uranium-235	-0.133	U	0.370	0.370		0.301	pCi/g	11/05/20 13:43	11/28/20 10:42	1
Uranium-238	0.107	U	0.390	0.390		0.698	pCi/g	11/05/20 13:43	11/28/20 10:42	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-018

Lab Sample ID: 160-40140-18

Date Collected: 10/27/20 11:31

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.292		0.194	0.196		0.0792	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Actinium-227	-0.0433	U	0.564	0.564		0.358	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Bismuth-212	-0.444	U	0.914	0.915		0.715	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Bismuth-214	0.215		0.144	0.145		0.0555	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Cesium-137	0.0242	U	0.0564	0.0565	0.0700	0.0438	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Lead-210	-0.225	U	1.43	1.43		1.18	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Lead-212	0.297		0.0862	0.0944		0.0485	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Lead-214	0.251		0.104	0.107		0.0400	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Potassium-40	7.89		1.36	1.58		0.137	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Protactinium-231	-0.849	U	2.48	2.48		2.01	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Protactinium-234	-0.101	U	0.269	0.269		0.218	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Radium-226	0.215		0.144	0.145	0.200	0.0555	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Radium-228	0.292		0.194	0.196		0.0792	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Thallium-208	0.133		0.0537	0.0554		0.0216	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Thorium 228	0.297		0.0862	0.0944		0.0485	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Thorium-232	0.292		0.194	0.196		0.0792	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Thorium-234	-0.468	U	0.799	0.800		0.978	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Uranium-235	-0.227	U	0.425	0.425		0.450	pCi/g	11/05/20 13:43	11/28/20 10:43	1
Uranium-238	-0.468	U	0.799	0.800		0.978	pCi/g	11/05/20 13:43	11/28/20 10:43	1

Client Sample ID: HPPG-317364365-SU28B-019

Lab Sample ID: 160-40140-19

Date Collected: 10/27/20 11:32

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.433		0.123	0.131		0.0746	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Actinium-227	0.226	U	0.489	0.490		0.295	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Bismuth-212	0.000	U	0.266	0.266		0.511	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Bismuth-214	0.384		0.124	0.130		0.0506	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Cesium-137	0.0138	U	0.0585	0.0585	0.0700	0.0470	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Lead-210	-0.646	U	1.48	1.49		1.24	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Lead-212	0.295		0.0758	0.0848		0.0404	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Lead-214	0.293		0.105	0.109		0.0629	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Potassium-40	7.57		1.18	1.41		0.258	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Protactinium-231	0.275	U	2.44	2.44		2.00	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Protactinium-234	-0.0226	U	0.0653	0.0653		0.250	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Radium-226	0.384		0.124	0.130	0.200	0.0506	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Radium-228	0.433		0.123	0.131		0.0746	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thallium-208	0.138		0.0477	0.0498		0.0176	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thorium 228	0.295		0.0758	0.0848		0.0404	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thorium-232	0.433		0.123	0.131		0.0746	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thorium-234	-0.897	U	0.722	0.729		0.772	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Uranium-235	0.270	U	0.240	0.242		0.330	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Uranium-238	-0.897	U	0.722	0.729		0.772	pCi/g	11/05/20 13:44	11/28/20 10:44	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-020

Lab Sample ID: 160-40140-20

Date Collected: 10/27/20 11:34

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.487		0.178	0.186		0.122	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Actinium-227	0.123	U	0.272	0.272		0.390	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Bismuth-212	0.298	U	1.31	1.31		1.06	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Bismuth-214	0.262		0.120	0.124		0.0573	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Cesium-137	-0.0402	U	0.0754	0.0756	0.0700	0.0658	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Lead-210	-0.883	U	1.77	1.78		1.49	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Lead-212	0.389		0.0916	0.102		0.0444	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Lead-214	0.344		0.0967	0.105		0.0466	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Potassium-40	9.35		1.49	1.84		0.276	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Protactinium-231	0.192	U	1.02	1.03		1.60	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Protactinium-234	0.225	U	0.130	0.133		0.278	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Radium-226	0.262		0.120	0.124	0.200	0.0573	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Radium-228	0.487		0.178	0.186		0.122	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thallium-208	0.169		0.0574	0.0606		0.0209	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thorium 228	0.389		0.0916	0.102		0.0444	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thorium-232	0.487		0.178	0.186		0.122	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Thorium-234	0.231	U	0.512	0.513		0.404	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Uranium-235	0.161	U	0.507	0.508		0.412	pCi/g	11/05/20 13:44	11/28/20 10:44	1
Uranium-238	0.231	U	0.512	0.513		0.404	pCi/g	11/05/20 13:44	11/28/20 10:44	1

Client Sample ID: HPPG-317364365-SU28B-021

Lab Sample ID: 160-40140-21

Date Collected: 10/27/20 11:35

Matrix: Solid

Date Received: 10/28/20 11:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0445		0.0541	0.0542	0.160	0.0409	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	106		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	-0.00581	U	0.00670	0.00672	0.100	0.00780	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.00775		0.00775	0.00778	0.100	0.00451	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	93.2		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.315		0.0552	0.0612	0.250	0.0157	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.00794	U	0.0140	0.0140	0.100	0.00871	pCi/g	11/10/20 17:08	12/07/20 15:14	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-021

Lab Sample ID: 160-40140-21

Date Collected: 10/27/20 11:35

Matrix: Solid

Date Received: 10/28/20 11:30

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-238	0.361		0.0557	0.0634	0.250	0.00494	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	81.8		30 - 110					11/10/20 17:08	12/07/20 15:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.281		0.189	0.191		0.0861	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Actinium-227	0.189	U	0.366	0.367		0.209	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Bismuth-212	0.000	U	0.239	0.239		0.363	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Bismuth-214	0.0770	U	0.0993	0.0996		0.115	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Cesium-137	0.0170	U	0.0330	0.0330	0.0700	0.0252	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Lead-210	0.477	U	1.04	1.04		0.831	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Lead-212	0.355		0.0630	0.0780		0.0261	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Lead-214	0.255		0.0817	0.0859		0.0382	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Potassium-40	8.65		1.06	1.38		0.0760	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Protactinium-231	0.0370	U	2.09	2.09		1.72	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Protactinium-234	0.0529	U	0.149	0.149		0.148	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Radium-226	0.0770	U	0.0993	0.0996	0.200	0.115	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Radium-228	0.281		0.189	0.191		0.0861	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Thallium-208	0.121		0.0464	0.0480		0.0176	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Thorium 228	0.355		0.0630	0.0780		0.0261	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Thorium-232	0.281		0.189	0.191		0.0861	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Thorium-234	0.336	U	0.659	0.660		0.694	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Uranium-235	0.000	U	0.118	0.118		0.275	pCi/g	11/05/20 19:07	11/27/20 19:13	1
Uranium-238	0.336	U	0.659	0.660		0.694	pCi/g	11/05/20 19:07	11/27/20 19:13	1

Client Sample ID: HPPG-317364365-SU28B-022

Lab Sample ID: 160-40140-22

Date Collected: 10/27/20 11:37

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.400		0.157	0.162		0.0343	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Actinium-227	0.0198	U	0.0854	0.0854		0.368	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Bismuth-212	-0.0193	U	0.731	0.731		0.600	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Bismuth-214	0.329		0.119	0.124		0.0485	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Cesium-137	-0.0207	U	0.0677	0.0677	0.0700	0.0538	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Lead-210	-0.865	U	1.65	1.65		1.10	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Lead-212	0.303		0.0907	0.0987		0.0526	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Lead-214	0.401		0.108	0.116		0.0454	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Potassium-40	9.38		1.51	1.79		0.141	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Protactinium-231	-0.0190	U	2.56	2.56		2.10	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Protactinium-234	0.159	U	0.208	0.208		0.203	pCi/g	11/05/20 19:07	11/27/20 19:12	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-022

Lab Sample ID: 160-40140-22

Date Collected: 10/27/20 11:37

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.329		0.119	0.124	0.200	0.0485	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Radium-228	0.400		0.157	0.162		0.0343	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Thallium-208	0.0794		0.101	0.101		0.0491	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Thorium 228	0.303		0.0907	0.0987		0.0526	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Thorium-232	0.400		0.157	0.162		0.0343	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Thorium-234	-0.481	U	0.908	0.909		0.994	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Uranium-235	0.150	U	0.355	0.356		0.385	pCi/g	11/05/20 19:07	11/27/20 19:12	1
Uranium-238	-0.481	U	0.908	0.909		0.994	pCi/g	11/05/20 19:07	11/27/20 19:12	1

Client Sample ID: HPPG-317364365-SU28B-023

Lab Sample ID: 160-40140-23

Date Collected: 10/27/20 11:38

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.303		0.130	0.134		0.132	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Actinium-227	0.140	U	0.448	0.448		0.314	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Bismuth-212	0.191	U	0.477	0.477		0.367	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Bismuth-214	0.320		0.101	0.106		0.0427	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Cesium-137	0.0153	U	0.0356	0.0356	0.0700	0.0270	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Lead-210	-1.16	U	1.59	1.59		1.35	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Lead-212	0.289		0.0790	0.0874		0.0432	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Lead-214	0.264		0.0972	0.101		0.0530	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Potassium-40	8.42		1.29	1.55		0.275	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Protactinium-231	0.000	U	0.422	0.422		2.01	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Protactinium-234	-0.103	U	0.239	0.239		0.193	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Radium-226	0.320		0.101	0.106	0.200	0.0427	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Radium-228	0.303		0.130	0.134		0.132	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thallium-208	0.0868		0.0451	0.0460		0.0210	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thorium 228	0.289		0.0790	0.0874		0.0432	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thorium-232	0.303		0.130	0.134		0.132	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thorium-234	-0.942	U	0.670	0.678		0.808	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Uranium-235	0.000	U	0.179	0.179		0.453	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Uranium-238	-0.942	U	0.670	0.678		0.808	pCi/g	11/05/20 19:07	11/27/20 19:15	1

Client Sample ID: HPPG-317364365-SU28B-024

Lab Sample ID: 160-40140-24

Date Collected: 10/27/20 11:40

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.286		0.262	0.264		0.134	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Actinium-227	0.263	U	0.608	0.609		0.365	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Bismuth-212	0.000	U	0.681	0.681		0.655	pCi/g	11/05/20 19:07	11/27/20 19:15	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-317364365-SU28B-024

Lab Sample ID: 160-40140-24

Date Collected: 10/27/20 11:40

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-214	0.344		0.129	0.135		0.0524	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Cesium-137	0.0188	U	0.0551	0.0551	0.0700	0.0428	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Lead-210	0.921	U	1.50	1.50		1.01	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Lead-212	0.324		0.0988	0.106		0.0566	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Lead-214	0.385		0.131	0.138		0.0736	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Potassium-40	8.98		1.54	1.85		0.302	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Protactinium-231	0.834	U	2.18	2.18		2.39	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Protactinium-234	0.230	U	0.133	0.135		0.266	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Radium-226	0.344		0.129	0.135	0.200	0.0524	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Radium-228	0.286		0.262	0.264		0.134	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thallium-208	0.0742		0.0936	0.0940		0.0453	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thorium 228	0.324		0.0988	0.106		0.0566	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thorium-232	0.286		0.262	0.264		0.134	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Thorium-234	0.928		0.559	0.571		0.363	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Uranium-235	-0.208	U	0.175	0.177		0.460	pCi/g	11/05/20 19:07	11/27/20 19:15	1
Uranium-238	0.928		0.559	0.571		0.363	pCi/g	11/05/20 19:07	11/27/20 19:15	1

Client Sample ID: HPPG-317364365-SU28B-025

Lab Sample ID: 160-40140-25

Date Collected: 10/27/20 11:42

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.377		0.161	0.165		0.0399	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Actinium-227	0.158	U	0.377	0.377		0.305	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Bismuth-212	0.0362	U	0.837	0.837		0.685	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Bismuth-214	0.450		0.149	0.156		0.0563	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Cesium-137	0.0184	U	0.0440	0.0441	0.0700	0.0330	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Lead-210	0.941	U	1.43	1.44		0.989	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Lead-212	0.428		0.0925	0.103		0.0418	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Lead-214	0.462		0.126	0.135		0.0491	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Potassium-40	8.59		1.59	1.81		0.248	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Protactinium-231	-0.831	U	3.16	3.16		2.58	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Protactinium-234	0.0820	U	0.255	0.255		0.207	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Radium-226	0.450		0.149	0.156	0.200	0.0563	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Radium-228	0.377		0.161	0.165		0.0399	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thallium-208	0.112		0.0444	0.0458		0.00983	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thorium 228	0.428		0.0925	0.103		0.0418	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thorium-232	0.377		0.161	0.165		0.0399	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thorium-234	0.860		0.631	0.638		0.386	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Uranium-235	0.102	U	0.238	0.238		0.392	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Uranium-238	0.860		0.631	0.638		0.386	pCi/g	11/05/20 19:07	11/27/20 20:43	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Client Sample ID: HPPG-F-021

Lab Sample ID: 160-40140-26

Date Collected: 10/27/20 11:02

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.513		0.115	0.127		0.0249	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Actinium-227	0.144	U	0.299	0.300		0.262	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Bismuth-212	-0.539	U	0.900	0.901		0.706	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Bismuth-214	0.286		0.101	0.105		0.0409	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Cesium-137	0.0198	U	0.0461	0.0462	0.0700	0.0359	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Lead-210	1.13		1.35	1.36		0.831	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Lead-212	0.294		0.0767	0.0856		0.0422	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Lead-214	0.278		0.0956	0.0999		0.0578	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Potassium-40	8.28		1.22	1.48		0.255	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Protactinium-231	0.515	U	1.52	1.52		1.67	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Protactinium-234	0.0533	U	0.0837	0.0839		0.166	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Radium-226	0.286		0.101	0.105	0.200	0.0409	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Radium-228	0.513		0.115	0.127		0.0249	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Thallium-208	0.0787		0.0614	0.0619		0.0325	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Thorium 228	0.294		0.0767	0.0856		0.0422	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Thorium-232	0.513		0.115	0.127		0.0249	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Thorium-234	-0.628	U	0.818	0.821		0.658	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Uranium-235	0.0880	U	0.273	0.273		0.220	pCi/g	11/05/20 19:07	11/27/20 20:45	1
Uranium-238	-0.628	U	0.818	0.821		0.658	pCi/g	11/05/20 19:07	11/27/20 20:45	1

Client Sample ID: HPPG-F-022

Lab Sample ID: 160-40140-27

Date Collected: 10/27/20 11:23

Matrix: Solid

Date Received: 10/28/20 11:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.323		0.219	0.221		0.0955	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Actinium-227	0.200	U	0.548	0.548		0.329	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Bismuth-212	0.285	U	0.536	0.537		0.388	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Bismuth-214	0.388		0.130	0.136		0.0516	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Cesium-137	0.000710	U	0.0734	0.0734	0.0700	0.0601	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Lead-210	1.05		1.14	1.15		0.764	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Lead-212	0.475		0.101	0.118		0.0417	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Lead-214	0.296		0.120	0.124		0.110	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Potassium-40	8.74		1.64	1.87		0.285	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Protactinium-231	0.344	U	1.39	1.39		2.18	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Protactinium-234	0.0452	U	0.0769	0.0770		0.183	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Radium-226	0.388		0.130	0.136	0.200	0.0516	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Radium-228	0.323		0.219	0.221		0.0955	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thallium-208	0.178		0.0655	0.0681		0.0204	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thorium 228	0.475		0.101	0.118		0.0417	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thorium-232	0.323		0.219	0.221		0.0955	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Thorium-234	0.642		0.545	0.550		0.416	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Uranium-235	0.0239	U	0.108	0.108		0.324	pCi/g	11/05/20 19:07	11/27/20 20:43	1
Uranium-238	0.642		0.545	0.550		0.416	pCi/g	11/05/20 19:07	11/27/20 20:43	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490265/23-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490265

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02016	U	0.0539	0.0539	0.160	0.0460	pCi/g	11/25/20 14:30	12/11/20 07:07	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/25/20 14:30		12/11/20 07:07	
	96.3								1	

Lab Sample ID: LCS 160-490265/1-A
Matrix: Solid
Analysis Batch: 491444

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490265

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.76	6.013		0.491	0.160	0.0470	pCi/g	77	75 - 125	
Carrier	LCS	LCS	Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	109									

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-488775/1-A
Matrix: Solid
Analysis Batch: 491105

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488775

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.0000	U	0.0152	0.0152	0.250	0.0125	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.002733	U	0.00947	0.00947	0.100	0.00636	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	-0.002192	U	0.0181	0.0181	0.250	0.0153	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	MB	MB	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/10/20 17:08		12/07/20 15:14	
	81.2								1	

Lab Sample ID: LCS 160-488775/2-A
Matrix: Solid
Analysis Batch: 491106

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488775

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Uranium-234	3.18	3.300		0.328	0.250	0.0121	pCi/g	104	84 - 120	
Uranium-238	3.26	3.432		0.339	0.250	0.00541	pCi/g	105	82 - 122	
Tracer	LCS	LCS	Limits							
Uranium-232	%Yield	Qualifier	30 - 110							
	78.7									

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-488774/1-A
Matrix: Solid
Analysis Batch: 491103

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488774

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.005594	U	0.0194	0.0194	0.100	0.0150	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.003733	U	0.00747	0.00747	0.100	0.00434	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	MB	MB	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	92.5		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Lab Sample ID: LCS 160-488774/2-A
Matrix: Solid
Analysis Batch: 491099

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488774

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Plutonium-238	2.61	2.527		0.255	0.100	0.0205	pCi/g	97	80 - 125
Plutonium-239/240	2.64	2.457		0.248	0.100	0.00633	pCi/g	93	81 - 125
Tracer	LCS	LCS	Limits						
Pu-242 (T)	97.3		30 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488417/1-A
Matrix: Solid
Analysis Batch: 490487

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488417

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.05102	U	0.162	0.162		0.0829	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Actinium-227	0.1323	U	0.223	0.224		0.222	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Bismuth-212	0.3574	U	0.707	0.708		0.540	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Bismuth-214	0.07997	U	0.100	0.100		0.136	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Cesium-137	0.001281	U	0.0520	0.0520	0.0700	0.0426	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Lead-210	1.205		1.35	1.36		0.875	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Lead-212	-0.01543	U	0.0895	0.0895		0.0742	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Lead-214	-0.01068	U	0.0574	0.0574		0.0480	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Potassium-40	-0.1676	U	0.801	0.801		0.491	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Protactinium-231	0.0000	U	0.272	0.272		1.79	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Protactinium-234	0.08363	U	0.150	0.150		0.107	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Radium-226	0.07997	U	0.100	0.100	0.200	0.136	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Radium-228	0.05102	U	0.162	0.162		0.0829	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Thallium-208	0.008432	U	0.0165	0.0165		0.0285	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Thorium 228	-0.01543	U	0.0895	0.0895		0.0742	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Thorium-232	0.05102	U	0.162	0.162		0.0829	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Thorium-234	0.3559		0.432	0.434		0.274	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Uranium-235	-0.1336	U	0.194	0.194		0.244	pCi/g	11/05/20 13:43	11/28/20 09:44	1
Uranium-238	0.3559		0.432	0.434		0.274	pCi/g	11/05/20 13:43	11/28/20 09:44	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488417/2-A
 Matrix: Solid
 Analysis Batch: 490483

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 488417

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	96.80		10.2		0.642	pCi/g	100	87 - 116	
Cesium-137	26.8	26.50		2.86	0.0700	0.114	pCi/g	99	87 - 120	
Cobalt-60	9.52	9.574		1.04		0.0186	pCi/g	101	87 - 115	

Lab Sample ID: 160-40140-1 DU
 Matrix: Solid
 Analysis Batch: 490468

Client Sample ID: HPPG-317364365-SU28B-001
 Prep Type: Total/NA
 Prep Batch: 488417

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.397		0.4517		0.126		0.0610	pCi/g	0.19	1
Actinium-227	0.105	U	-0.1525	U	0.473		0.275	pCi/g	0.37	1
Bismuth-212	0.446	U	0.2877	U	0.501		0.383	pCi/g	0.13	1
Bismuth-214	0.516		0.3562		0.103		0.0405	pCi/g	0.60	1
Cesium-137	-0.0304	U	0.001642	U	0.0404	0.0700	0.0331	pCi/g	0.31	1
Lead-210	0.851	U	-0.7701	U	1.70		1.37	pCi/g	0.45	1
Lead-212	0.406		0.3244		0.0841		0.0389	pCi/g	0.42	1
Lead-214	0.496		0.3762		0.111		0.0591	pCi/g	0.47	1
Potassium-40	9.59		8.291		1.42		0.239	pCi/g	0.38	1
Protactinium-231	0.694	U	0.0000	U	0.498		1.69	pCi/g	0.26	1
Protactinium-234	-0.0405	U	0.09792	U	0.0924		0.183	pCi/g	0.67	1
Radium-226	0.516		0.3562		0.103	0.200	0.0405	pCi/g	0.60	1
Radium-228	0.397		0.4517		0.126		0.0610	pCi/g	0.19	1
Thallium-208	0.141		0.1421		0.0456		0.0130	pCi/g	0.01	1
Thorium 228	0.406		0.3244		0.0841		0.0389	pCi/g	0.42	1
Thorium-232	0.397		0.4517		0.126		0.0610	pCi/g	0.19	1
Thorium-234	0.535		-0.3313	U	0.261		0.882	pCi/g	0.84	1
Uranium-235	0.0761	U	0.08281	U	0.171		0.314	pCi/g	0.02	1
Uranium-238	0.535		-0.3313	U	0.261		0.882	pCi/g	0.84	1

Lab Sample ID: MB 160-488430/1-A
 Matrix: Solid
 Analysis Batch: 490335

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 488430

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.1242	U	0.470	0.470		0.273	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-212	0.3039	U	0.553	0.554		0.417	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-214	-0.05711	U	0.141	0.141		0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Cesium-137	-0.02341	U	0.0487	0.0487	0.0700	0.0374	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-210	-0.03139	U	0.832	0.832		0.682	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-212	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-214	-0.09519	U	0.108	0.108		0.0715	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Potassium-40	0.005577	U	0.404	0.404		0.324	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-231	0.07444	U	0.900	0.900		1.39	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-234	0.01098	U	0.155	0.155		0.127	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Radium-226	-0.05711	U	0.141	0.141	0.200	0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-488430/1-A
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488430

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared		Analyzed		Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)				11/05/20 19:07	11/27/20 19:09	11/05/20 19:07	11/27/20 19:09	
Radium-228	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09			1
Thallium-208	0.01737	U	0.0439	0.0439		0.0237	pCi/g	11/05/20 19:07	11/27/20 19:09			1
Thorium 228	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09			1
Thorium-232	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09			1
Thorium-234	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09			1
Uranium-235	-0.006199	U	0.0105	0.0105		0.215	pCi/g	11/05/20 19:07	11/27/20 19:09			1
Uranium-238	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09			1

Lab Sample ID: LCS 160-488430/2-A
Matrix: Solid
Analysis Batch: 490333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488430

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	97.59		11.5		0.634	pCi/g	101	87 - 116
Cesium-137	26.8	29.30		3.08	0.0700	0.128	pCi/g	110	87 - 120
Cobalt-60	9.52	10.55		1.17		0.0583	pCi/g	111	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Rad

Leach Batch: 487629

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-1	HPPG-317364365-SU28B-001	Total/NA	Solid	Dry and Grind	
160-40140-2	HPPG-317364365-SU28B-002	Total/NA	Solid	Dry and Grind	
160-40140-3	HPPG-317364365-SU28B-003	Total/NA	Solid	Dry and Grind	
160-40140-4	HPPG-317364365-SU28B-004	Total/NA	Solid	Dry and Grind	
160-40140-5	HPPG-317364365-SU28B-005	Total/NA	Solid	Dry and Grind	
160-40140-6	HPPG-317364365-SU28B-006	Total/NA	Solid	Dry and Grind	
160-40140-7	HPPG-317364365-SU28B-007	Total/NA	Solid	Dry and Grind	
160-40140-8	HPPG-317364365-SU28B-008	Total/NA	Solid	Dry and Grind	
160-40140-9	HPPG-317364365-SU28B-009	Total/NA	Solid	Dry and Grind	
160-40140-10	HPPG-317364365-SU28B-010	Total/NA	Solid	Dry and Grind	
160-40140-11	HPPG-317364365-SU28B-011	Total/NA	Solid	Dry and Grind	
160-40140-12	HPPG-317364365-SU28B-012	Total/NA	Solid	Dry and Grind	
160-40140-13	HPPG-317364365-SU28B-013	Total/NA	Solid	Dry and Grind	
160-40140-14	HPPG-317364365-SU28B-014	Total/NA	Solid	Dry and Grind	
160-40140-15	HPPG-317364365-SU28B-015	Total/NA	Solid	Dry and Grind	
160-40140-16	HPPG-317364365-SU28B-016	Total/NA	Solid	Dry and Grind	
160-40140-17	HPPG-317364365-SU28B-017	Total/NA	Solid	Dry and Grind	
160-40140-18	HPPG-317364365-SU28B-018	Total/NA	Solid	Dry and Grind	
160-40140-19	HPPG-317364365-SU28B-019	Total/NA	Solid	Dry and Grind	
160-40140-20	HPPG-317364365-SU28B-020	Total/NA	Solid	Dry and Grind	
160-40140-21	HPPG-317364365-SU28B-021	Total/NA	Solid	Dry and Grind	
160-40140-22	HPPG-317364365-SU28B-022	Total/NA	Solid	Dry and Grind	
160-40140-23	HPPG-317364365-SU28B-023	Total/NA	Solid	Dry and Grind	
160-40140-24	HPPG-317364365-SU28B-024	Total/NA	Solid	Dry and Grind	
160-40140-1 DU	HPPG-317364365-SU28B-001	Total/NA	Solid	Dry and Grind	

Leach Batch: 487630

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-25	HPPG-317364365-SU28B-025	Total/NA	Solid	Dry and Grind	
160-40140-26	HPPG-F-021	Total/NA	Solid	Dry and Grind	
160-40140-27	HPPG-F-022	Total/NA	Solid	Dry and Grind	

Prep Batch: 488417

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-1	HPPG-317364365-SU28B-001	Total/NA	Solid	Fill_Geo-21	487629
160-40140-2	HPPG-317364365-SU28B-002	Total/NA	Solid	Fill_Geo-21	487629
160-40140-3	HPPG-317364365-SU28B-003	Total/NA	Solid	Fill_Geo-21	487629
160-40140-4	HPPG-317364365-SU28B-004	Total/NA	Solid	Fill_Geo-21	487629
160-40140-5	HPPG-317364365-SU28B-005	Total/NA	Solid	Fill_Geo-21	487629
160-40140-6	HPPG-317364365-SU28B-006	Total/NA	Solid	Fill_Geo-21	487629
160-40140-7	HPPG-317364365-SU28B-007	Total/NA	Solid	Fill_Geo-21	487629
160-40140-8	HPPG-317364365-SU28B-008	Total/NA	Solid	Fill_Geo-21	487629
160-40140-9	HPPG-317364365-SU28B-009	Total/NA	Solid	Fill_Geo-21	487629
160-40140-10	HPPG-317364365-SU28B-010	Total/NA	Solid	Fill_Geo-21	487629
160-40140-11	HPPG-317364365-SU28B-011	Total/NA	Solid	Fill_Geo-21	487629
160-40140-12	HPPG-317364365-SU28B-012	Total/NA	Solid	Fill_Geo-21	487629
160-40140-13	HPPG-317364365-SU28B-013	Total/NA	Solid	Fill_Geo-21	487629
160-40140-14	HPPG-317364365-SU28B-014	Total/NA	Solid	Fill_Geo-21	487629
160-40140-15	HPPG-317364365-SU28B-015	Total/NA	Solid	Fill_Geo-21	487629
160-40140-16	HPPG-317364365-SU28B-016	Total/NA	Solid	Fill_Geo-21	487629
160-40140-17	HPPG-317364365-SU28B-017	Total/NA	Solid	Fill_Geo-21	487629

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
 SDG: GJ46599777

Rad (Continued)

Prep Batch: 488417 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-18	HPPG-317364365-SU28B-018	Total/NA	Solid	Fill_Geo-21	487629
160-40140-19	HPPG-317364365-SU28B-019	Total/NA	Solid	Fill_Geo-21	487629
160-40140-20	HPPG-317364365-SU28B-020	Total/NA	Solid	Fill_Geo-21	487629
MB 160-488417/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488417/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40140-1 DU	HPPG-317364365-SU28B-001	Total/NA	Solid	Fill_Geo-21	487629

Prep Batch: 488430

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-21	HPPG-317364365-SU28B-021	Total/NA	Solid	Fill_Geo-21	487629
160-40140-22	HPPG-317364365-SU28B-022	Total/NA	Solid	Fill_Geo-21	487629
160-40140-23	HPPG-317364365-SU28B-023	Total/NA	Solid	Fill_Geo-21	487629
160-40140-24	HPPG-317364365-SU28B-024	Total/NA	Solid	Fill_Geo-21	487629
160-40140-25	HPPG-317364365-SU28B-025	Total/NA	Solid	Fill_Geo-21	487630
160-40140-26	HPPG-F-021	Total/NA	Solid	Fill_Geo-21	487630
160-40140-27	HPPG-F-022	Total/NA	Solid	Fill_Geo-21	487630
MB 160-488430/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488430/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-1	HPPG-317364365-SU28B-001	Total/NA	Solid	ExtChrom	487629
160-40140-11	HPPG-317364365-SU28B-011	Total/NA	Solid	ExtChrom	487629
160-40140-21	HPPG-317364365-SU28B-021	Total/NA	Solid	ExtChrom	487629
MB 160-488774/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488774/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 488775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-1	HPPG-317364365-SU28B-001	Total/NA	Solid	ExtChrom	487629
160-40140-11	HPPG-317364365-SU28B-011	Total/NA	Solid	ExtChrom	487629
160-40140-21	HPPG-317364365-SU28B-021	Total/NA	Solid	ExtChrom	487629
MB 160-488775/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488775/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 490265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40140-1	HPPG-317364365-SU28B-001	Total/NA	Solid	DPS-0	487629
160-40140-11	HPPG-317364365-SU28B-011	Total/NA	Solid	DPS-0	487629
160-40140-21	HPPG-317364365-SU28B-021	Total/NA	Solid	DPS-0	487629
MB 160-490265/23-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490265/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40140-1
SDG: GJ46599777

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40140-1	HPPG-317364365-SU28B-001	102	
160-40140-11	HPPG-317364365-SU28B-011	102	
160-40140-21	HPPG-317364365-SU28B-021	106	
LCS 160-490265/1-A	Lab Control Sample	109	
MB 160-490265/23-A	Method Blank	96.3	

Tracer/Carrier Legend
Sr = Sr Carrier

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40140-1	HPPG-317364365-SU28B-001	85.1	
160-40140-11	HPPG-317364365-SU28B-011	87.1	
160-40140-21	HPPG-317364365-SU28B-021	93.2	
LCS 160-488774/2-A	Lab Control Sample	97.3	
MB 160-488774/1-A	Method Blank	92.5	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40140-1	HPPG-317364365-SU28B-001	74.4	
160-40140-11	HPPG-317364365-SU28B-011	85.7	
160-40140-21	HPPG-317364365-SU28B-021	81.8	
LCS 160-488775/2-A	Lab Control Sample	78.7	
MB 160-488775/1-A	Method Blank	81.2	

Tracer/Carrier Legend
U-232 = Uranium-232



Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40141-1
Laboratory Sample Delivery Group: D1189467
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/14/2020 9:52:07 PM

Rhonda Ridenhower, Client Service Manager
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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Job ID: 160-40141-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40141-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/28/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Job ID: 160-40141-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 15.7 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-317364365-SU28B-B-001 (160-40141-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 11/01/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: HPPG-317364365-SU28B-B-001 (160-40141-1). The samples contained rocks of varying sizes.

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-317364365-SU28B-B-001 (160-40141-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 11/01/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488774/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.HPPG-317364365-SU28B-B-001 (160-40141-1), (LCS 160-488774/2-A), (MB 160-488774/1-A), (160-40094-A-1-E) and (160-40094-A-1-K DU)

During analysis the pulser (used for the daily checks) was left on inadvertently which caused the scaling to be greater than normal. Manual integration was performed in order to "zoom in" to the correct scaling for the samples. Both, the original and the "zoomed in" spectra PDF's, are included in the deliverable. HPPG-317364365-SU28B-B-001 (160-40141-1), (LCS 160-488774/2-A), (MB 160-488774/1-A), (160-40094-A-1-E) and (160-40094-A-1-K DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-317364365-SU28B-B-001 (160-40141-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 11/01/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.HPPG-317364365-SU28B-B-001 (160-40141-1), (LCS 160-488775/2-A), (MB 160-488775/1-A), (160-40094-A-1-G) and (160-40094-A-1-J DU)

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488775/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-317364365-SU28B-B-001 (160-40141-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/01/2020, prepared on 11/05/2020 and analyzed on 11/27/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238



Client: Aptim Federal Services LLC
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Job ID: 160-40141-1
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Job ID: 160-40141-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

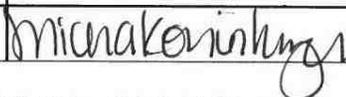
The MB z-score for Co-60 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-488430/1-A)

The replicate precision for Ac-228/Ra-228/Th-232 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40199-A-8-C DU)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Co-60: (MB 160-488430/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

All Transfers for COC 501197RSY-021

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/27/2020 16:09	SHIPPED TO LAB FEDEX		11:30 OCT 28 2020

MICHA KORRINIZER



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40141-1

SDG Number: D1189467

Login Number: 40141**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40141-1	HPPG-317364365-SU28B-B-001	Solid	10/27/20 15:08	10/28/20 11:30	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
 SDG: D1189467

Client Sample ID: HPPG-317364365-SU28B-B-001

Lab Sample ID: 160-40141-1

Date Collected: 10/27/20 15:08

Matrix: Solid

Date Received: 10/28/20 11:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0108	U	0.0512	0.0512	0.160	0.0412	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	105		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.00200	U	0.00896	0.00896	0.100	0.00659	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.00602		0.00897	0.00898	0.100	0.00466	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	90.5		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.348		0.0565	0.0636	0.250	0.0138	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.0235		0.0156	0.0158	0.100	0.00606	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	0.391		0.0578	0.0664	0.250	0.00688	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	87.2		30 - 110					11/10/20 17:08	12/07/20 15:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.514		0.122	0.133		0.0401	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Actinium-227	-0.263	U	0.513	0.514		0.295	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Bismuth-212	-0.0213	U	0.593	0.593		0.487	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Bismuth-214	0.345		0.0899	0.0968		0.0335	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Cesium-137	-0.0169	U	0.0531	0.0531	0.0700	0.0423	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Lead-210	0.149	U	1.28	1.28		1.05	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Lead-212	0.376		0.0737	0.0883		0.0330	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Lead-214	0.450		0.126	0.134		0.0521	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Potassium-40	8.65		1.21	1.50		0.256	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Protactinium-231	0.000	U	0.417	0.417		1.84	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Protactinium-234	-0.0844	U	0.236	0.236		0.192	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Radium-226	0.345		0.0899	0.0968	0.200	0.0335	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Radium-228	0.514		0.122	0.133		0.0401	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Thallium-208	0.164		0.0546	0.0572		0.0204	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Thorium 228	0.376		0.0737	0.0883		0.0330	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Thorium-232	0.514		0.122	0.133		0.0401	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Thorium-234	-0.395	U	0.475	0.477		1.04	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Uranium-235	0.0810	U	0.168	0.168		0.342	pCi/g	11/05/20 19:07	11/27/20 20:46	1
Uranium-238	-0.395	U	0.475	0.477		1.04	pCi/g	11/05/20 19:07	11/27/20 20:46	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
 SDG: D1189467

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490265/23-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490265

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02016	U	0.0539	0.0539	0.160	0.0460	pCi/g	11/25/20 14:30	12/11/20 07:07	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/25/20 14:30		12/11/20 07:07	
	96.3								1	

Lab Sample ID: LCS 160-490265/1-A
Matrix: Solid
Analysis Batch: 491444

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490265

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.76	6.013		0.491	0.160	0.0470	pCi/g	77	75 - 125	
Carrier	LCS	LCS	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/25/20 14:30		12/11/20 07:07	
	109								1	

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-488775/1-A
Matrix: Solid
Analysis Batch: 491105

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488775

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.0000	U	0.0152	0.0152	0.250	0.0125	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.002733	U	0.00947	0.00947	0.100	0.00636	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	-0.002192	U	0.0181	0.0181	0.250	0.0153	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	MB	MB	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/10/20 17:08		12/07/20 15:14	
	81.2								1	

Lab Sample ID: LCS 160-488775/2-A
Matrix: Solid
Analysis Batch: 491106

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488775

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Uranium-234	3.18	3.300		0.328	0.250	0.0121	pCi/g	104	84 - 120	
Uranium-238	3.26	3.432		0.339	0.250	0.00541	pCi/g	105	82 - 122	
Tracer	LCS	LCS	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/10/20 17:08		12/07/20 15:14	
	78.7								1	

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
 SDG: D1189467

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-488774/1-A
Matrix: Solid
Analysis Batch: 491103

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488774

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.005594	U	0.0194	0.0194	0.100	0.0150	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.003733	U	0.00747	0.00747	0.100	0.00434	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Pu-242 (T)	92.5		30 - 110		11/10/20 16:55	12/07/20 15:19	1			

Lab Sample ID: LCS 160-488774/2-A
Matrix: Solid
Analysis Batch: 491099

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488774

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Plutonium-238	2.61	2.527		0.255	0.100	0.0205	pCi/g	97	80 - 125
Plutonium-239/240	2.64	2.457		0.248	0.100	0.00633	pCi/g	93	81 - 125
Tracer	LCS %Yield	LCS Qualifier	Limits						
Pu-242 (T)	97.3		30 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488430/1-A
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488430

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Actinium-227	-0.1242	U	0.470	0.470		0.273	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-212	0.3039	U	0.553	0.554		0.417	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-214	-0.05711	U	0.141	0.141		0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Cesium-137	-0.02341	U	0.0487	0.0487	0.0700	0.0374	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-210	-0.03139	U	0.832	0.832		0.682	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-212	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-214	-0.09519	U	0.108	0.108		0.0715	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Potassium-40	0.005577	U	0.404	0.404		0.324	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-231	0.07444	U	0.900	0.900		1.39	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-234	0.01098	U	0.155	0.155		0.127	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Radium-226	-0.05711	U	0.141	0.141	0.200	0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Radium-228	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thallium-208	0.01737	U	0.0439	0.0439		0.0237	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium 228	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium-232	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium-234	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Uranium-235	-0.006199	U	0.0105	0.0105		0.215	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Uranium-238	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488430/2-A
Matrix: Solid
Analysis Batch: 490333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488430

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	97.59		11.5		0.634	pCi/g	101	87 - 116	
Cesium-137	26.8	29.30		3.08	0.0700	0.128	pCi/g	110	87 - 120	
Cobalt-60	9.52	10.55		1.17		0.0583	pCi/g	111	87 - 115	



QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
 SDG: D1189467

Rad

Leach Batch: 487630

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40141-1	HPPG-317364365-SU28B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 488430

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40141-1	HPPG-317364365-SU28B-B-001	Total/NA	Solid	Fill_Geo-21	487630
MB 160-488430/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488430/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40141-1	HPPG-317364365-SU28B-B-001	Total/NA	Solid	ExtChrom	487630
MB 160-488774/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488774/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 488775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40141-1	HPPG-317364365-SU28B-B-001	Total/NA	Solid	ExtChrom	487630
MB 160-488775/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488775/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 490265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40141-1	HPPG-317364365-SU28B-B-001	Total/NA	Solid	DPS-0	487630
MB 160-490265/23-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490265/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40141-1
SDG: D1189467

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40141-1	HPPG-317364365-SU28B-B-00	105	
LCS 160-490265/1-A	Lab Control Sample	109	
MB 160-490265/23-A	Method Blank	96.3	

Tracer/Carrier Legend
Sr = Sr Carrier

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40141-1	HPPG-317364365-SU28B-B-00	90.5	
LCS 160-488774/2-A	Lab Control Sample	97.3	
MB 160-488774/1-A	Method Blank	92.5	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40141-1	HPPG-317364365-SU28B-B-00	87.2	
LCS 160-488775/2-A	Lab Control Sample	78.7	
MB 160-488775/1-A	Method Blank	81.2	

Tracer/Carrier Legend
U-232 = Uranium-232